

MARTIN MARIETTA

Publicly Releasable

**ENVIRONMENTAL
RESTORATION
PROGRAM**

This document has received the necessary
patent and technical information reviews
and can be distributed without limitation.

**Water Quality Monitoring Report for
the White Oak Creek Embayment**

C. J. Ford
M. T. Wefer

ChemRisk Document No. 1080

MANAGED BY
MARTIN MARIETTA ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY
UCN-17560 (6 7-91)

Environmental Restoration Division
Document Management Center

COPY
ENERGY SYSTEMS
ER
>>>>

**Automated Sciences Group, Inc.
Oak Ridge, Tennessee**

contributed to the preparation of this document and
should not be considered an eligible contractor for its
review.

This report has been reproduced directly from the best available copy.

Available to DOE and DOE contractors from the Office of Scientific and
Technical Information, P.O. Box 62, Oak Ridge, TN 37831; prices
available from 615-576-8401, FTS 626-8401.

Available to the public from the National Technical Information Service,
U.S. Department of Commerce, 5285 Port Royal Rd., Springfield, VA
22161.

Energy Systems Environmental Restoration Program
Clinch River Environmental Restoration Program

**Water Quality Monitoring Report for the
White Oak Creek Embayment**

C. J. Ford
M. T. Wefer

Date Issued—January 1993

Prepared by
Environmental Sciences Division
Oak Ridge National Laboratory
ESD Publication 4039

Prepared for
U.S. Department of Energy
Office of Environmental Restoration and Waste Management
under budget and reporting code EW 20

OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37831-6285
managed by
MARTIN MARIETTA ENERGY SYSTEMS, INC.
for the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-84OR21400

Author Affiliations

C. J. Ford is a member of the Environmental Sciences Division, Oak Ridge National Laboratory, Martin Marietta Energy, Systems, Inc. M. T. Wefer is employed by Automated Sciences Group, Inc., Oak Ridge, Tennessee.

CONTENTS

FIGURES	v
TABLES	vii
ABBREVIATIONS	ix
ACKNOWLEDGMENTS	xi
EXECUTIVE SUMMARY	xiii
1. INTRODUCTION	1
1.1 SITE BACKGROUND	1
1.2 WOCE SITE CHARACTERIZATION	3
1.2.1 Phase 1 Sediment Sampling	3
1.2.2 Characterization of WOCE Sediments	3
1.2.3 Characterization of WOCE Surface Water	3
1.3 OBJECTIVES	3
2. MATERIALS AND METHODS: SAMPLE COLLECTION, ANALYSIS, AND REPORTING	7
2.1 Monitoring Stations, Strategy, and Methods	7
2.2 Water Quality Monitoring Variables	9
2.3 Requested Analyses and Procedures	9
2.4 Preanalytical Processing	11
2.5 Chain of Custody	11
2.6 Sample Identification	11
2.7 Quality Assurance/Quality Control	11
3. RESULTS	12
3.1 COMPOSITE SAMPLING	12
3.2 CONTINUOUS WATER QUALITY MONITORING	23
3.3 EVENT-SPECIFIC MONITORING	23
3.3.1 Sheet-to-Pile Installation	29
3.3.2 Rock Armoring	29
3.3.3 Jet Grouting	29
3.3.4 Dredging	30
3.3.5 Concrete Cap Installation	32
3.3.6 Rock Anchor Drilling	32
3.3.7 Postconstruction Monitoring	32
4. DISCUSSION	34
4.1 COMPOSITE SAMPLING	34
4.2 CONTINUOUS WATER QUALITY MONITORING	35
4.3 EVENT-SPECIFIC MONITORING	36
4.3.1 Sheet Pile Installation	36

4.3.2 Rock Armoring	36
4.3.3 Jet Grouting	36
4.3.4 Dredging	37
4.3.5 Concrete Installation	38
4.3.6 Rock Drilling	38
4.3.7 Postconstruction Monitoring	38
5. CONCLUSIONS	40
6. SUMMARY	41
7. REFERENCES	42
Appendix A. PHYSICAL-CHEMICAL MEASUREMENTS AND CONTAMINANT ANALYTICAL RESULTS FOR 24-h COMPOSITE SAMPLES FROM THE K-1513 AND WOC STATIONS	A-1
Appendix B. ROUTINE WATER QUALITY AND CONTAMINANT RESULTS FROM THE WOD MONITORING STATION	B-1
Appendix C. CONTINUOUS WATER QUALITY MONITORING RESULTS ...	C-1
Appendix D. WATER GRAB SAMPLE ANALYTICAL RESULTS FOR MONITORING OF SPECIFIC CONSTRUCTION ACTIVITIES	D-1
Appendix E. QUALITY ASSURANCE/QUALITY CONTROL DATA	E-1

FIGURES

1	Site map including location of sediment-retention structure and monitoring station	2
2	Continuous plot of hourly average water discharge from the White Oak Lake Dam, June 1991 through July 1992	10
3	Plots of 24-h composite samples taken at the mouth of White Oak Creek for (a) total ^{137}Cs (pCi/L), (b) particle-associated ^{137}Cs (pCi/g), (c) pH, (d) total suspended solids (mg/L), and (e) turbidity (NTU)	13
4	Plots of 24-h composite samples taken at the K-1513 water intake structure for (a) total ^{137}Cs (pCi/L), (b) particle-associated ^{137}Cs (pCi/g), (c) pH, (d) total suspended solids (mg/L), and (e) turbidity (NTU)	18
5	Continuous plots of (a) temperature, (b) pH, (c) dissolved oxygen, and (d) stage height for the water quality monitoring station at the mouth of White Oak Creek	25
6	Continuous plot of pH values for grout released to surface waters	31

TABLES

1	Chronology of construction activities monitored in association with the WOCE time-critical CERCLA removal action	5
2	Requested analyses and procedures for water quality monitoring in association with the WOCE time-critical CERCLA removal action	8
3	Water quality sampling results from 24-h composite sampler operations at K-1513 and the White Oak Creek mouth stations	23
4	Water quality monitoring results for the White Oak Creek mouth monitoring station	24
5	Summary of parameters, range, and number of observations for samples collected during sediment-retention structure construction at WOCK 0.0	30
6	Summary of parameters, range, and number of observations for samples collected during sediment dredging activities associated with construction of the sediment-retention structure at WOCK 0.0	32
7	List of parameters, range, and number of observations for samples collected during rock anchor drilling activities associated with construction of the sediment-retention structure at WOCK 0.0	33
A.1	Total ^{137}Cs results from 24-h composite samples	A-3
A.2	Water chemistry results from 24-h composite samples	A-10
A.3	Composite sampler particle-associated ^{137}Cs results	A-22
B.1	Radiological data for White Oak Dam outflows, June 1991 through June 1992	B-3
B.2	White Oak Dam physical-chemical parameters, June 1991 through July 1992	B-6
C.1	Water quality monitoring results for the White Oak Creek mouth station (CRM 20.8)	C-3
D.1	Water grab sample analytical results for monitoring of specific construction activities	D-3
E.1	Project quality assurance/quality control data for 24-h composite samples	E-3
E.2	Project quality assurance/quality control data for surface water grab samples	E-10

ABBREVIATIONS

ACD	Analytical Chemistry Division
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CRM	Clinch River mile
CRRI	Clinch River Remedial Investigation
EPA	U. S. Environmental Protection Agency
ER	Environmental Restoration
ESD	Environmental Sciences Division
LLRA	low-level radiological analysis
ORNL	Oak Ridge National Laboratory
QA/QC	quality assurance/quality control
RAL	radiochemical analysis laboratory
RCRA	Resource Conservation and Recovery Act
SOP	standard operating procedure
SOW	statement of work
TSS	total suspended solids
TVA	Tennessee Valley Authority
WAG	waste area grouping
WOC	White Oak Creek
WOCE	White Oak Creek Embayment
WOD	White Oak Dam
WOCK	White Oak Creek kilometer
WOL	White Oak Lake

ACKNOWLEDGMENTS

The authors wish to thank Tom Stephens and Susan Madix of the Environmental Sciences Division and Dan Levine and Scott Niemela of the Automated Sciences Group, Inc., Oak Ridge, Tennessee, for leading the teams that collected and processed the field data and samples. Thanks are also due Craig Brandt of the Engineering Physics and Mathematics Division; Antoinette Brenkert, David Cox, Rhonda Epler, and Jayne Haynes of the Environmental Sciences Division; Mark Bevelhimer, Dennis Crumby, and Don Harris of the Automated Sciences Group, Inc., Oak Ridge, Tennessee; and Jackie Grebmeier and Ken Ham of The University of Tennessee Graduate Program in Ecology for their assistance in field sampling. The untiring efforts put forth by Laury Hamilton and her staff of the ORNL Office of Environmental Health Protection, Environmental Surveillance Protection Section in maintaining and collecting samples from the 24-h composite samplers were invaluable to the project. Special thanks are also due Lauren Larsen of the Environmental Sciences Division and Marion Ferguson, Norman Teasley, and Jeff Wade of the ORNL Analytical Chemistry Division for their cooperation in the high-speed and high-quality analyses of all samples collected.

Data provided by P. Y. Goldberg, M. C. Salmons, and M. M. Stevens of the ORNL Office of Environmental Health Protection, and S. M. Gregory of the Environmental Sciences Division from monitoring of the White Oak Dam were invaluable to this report.

The reviews of this document by H. L. Boston, G. F. Cada, R. B. Cook, and R. R. Turner of the Environmental Sciences Division and B. L. Kimmel of the ORNL Environmental Restoration Division added significantly to the quality of this document and were greatly appreciated.

EXECUTIVE SUMMARY

Water quality monitoring activities that focused on the detection of resuspended sediments in the Clinch River were conducted in conjunction with the White Oak Creek Embayment (WOCE) time-critical Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) removal action to construct a sediment-retention structure at the mouth of White Oak Creek (WOC). Samples were collected by use of a 24-h composite sampler and through real-time water grab sampling of sediment plumes generated by the construction activities. Sampling stations were established both at the WOC mouth, immediately adjacent to the construction site, and at K-1513, the Oak Ridge K-25 Site drinking water intake approximately 9.6 km downstream in the Clinch River.

Surface water radiological data collected prior to coffer cell closure were used to gauge the effectiveness of the coffer-cell structure at the WOC mouth. These data showed low but measurable quantities of ^{137}Cs leaving the embayment under normal flow conditions.

At both the WOC mouth and K-1513 stations, ^{137}Cs levels were low during late summer and early fall, immediately following closure of the coffer-cell structure. At both stations, ^{137}Cs levels rose with increasing late fall rainstorms, runoff, and increasing TSS levels, a function of seasonal changes in water discharge from the WOC watershed.

Increases in stream pH caused by the release of cement during jet grout activities were observed at the WOC mouth. Cesium-137 also was observed coincident with jet grouting, though observed levels were comparable with discharges from White Oak Lake (WOL), and the observations may be attributed routine operations at White Oak Dam (WOD). Review of data from 24-h composite samples collected during concrete cap construction do not indicate increased ^{137}Cs or stream pH levels associated with these activities. No increases in ^{137}Cs or pH were observed at the K-1513 station during jet grouting.

For both 24-h composite samples (WOC and K-1513) and surface water grab samples ^{137}Cs activity increased in conjunction with sediment dredging and rock anchor drilling. At the WOC station, ^{137}Cs values for dredging at WOC were elevated by one to two orders of magnitude relative to nonconstruction reference levels observed from October through February. Values for K-1513 were also elevated for the time frame, though they were one to two orders of magnitude lower than those upstream.

Levels of particle-associated ^{137}Cs at both monitoring stations dropped below detection limits following completion of the sediment-retention structure. However, levels of ^{137}Cs are expected to be comparable to those observed following the establishment of surface-sediment control and nonconstruction monitoring. Cesium-137 releases to the Clinch River from WOD through WOCE appear to be related to sediment transport from WOL during high discharge events.

1. INTRODUCTION

The purpose of the White Oak Creek Embayment (WOCE) time-critical Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) removal action was to construct a coffer-cell sediment-retention structure at the mouth of WOCE. The sediment-retention structure was designed to contain contaminated sediments in lower WOCE and prevent their transport into the Clinch River for a period consistent with the eventual remediation of environmental contamination of the White Oak Creek (WOC) drainage. Other functions of the sediment-retention structure are discussed elsewhere (Kimmel and Ford 1991, Leslie and Kimmel 1992, Blaylock et al. 1993). This monitoring effort was focused on (1) the detection of contaminated WOCE sediments that, if disturbed, could be transported into the Clinch River during construction activities and (2) postconstruction monitoring to assess the effectiveness of the sediment-retention structure. The purpose of this report is to present and discuss the results of water quality monitoring activities from September 1991 through July 1992.

1.1 SITE BACKGROUND

WOC is the primary surface-water drainage for the Oak Ridge National Laboratory (ORNL) area (Fig. 1). The WOC drainage is described elsewhere (Blaylock et al. 1993). White Oak Lake (WOL) is a small impoundment of WOC that has served as a settling basin for low-level radioactive effluents from ORNL since 1943. The WOL dam, located approximately 1 km above the confluence of WOC and the Clinch River, is the last controlled ORNL discharge point on WOC (Blaylock et al. 1993). The WOCE extends downstream of the WOL dam to the confluence of WOC and the Clinch River at Clinch River Mile (CRM) 20.8 (Fig. 1).

Water flow conditions at the mouth of the embayment are regulated by operation of hydroelectric generators at the Melton Hill dam, located on the Clinch River 4.2 km upstream from the WOC mouth. This hydroelectric capacity is used to meet peak demands in the Tennessee Valley Authority's (TVA's) power production grid, usually generating electricity twice daily. The release of water associated with initiation of hydroelectric power generation causes water to flow upstream into WOCE. This surge is held in the embayment by the increased water level in the river resulting from hydroelectric generation. Upon completion of hydropower operation, the water level in the river decreases, and the water flow in WOC reverses again, moving water from the WOCE into the Clinch River. Prior to construction of the sediment-retention structure, water depth changed by 2 ft or more throughout the embayment in as little as 5 min following hydropower start-up or shutdown (Blaylock et al. 1993). The hydrodynamics of the WOCE are described elsewhere (Kimmel and Ford 1991, Blaylock et al. 1993).

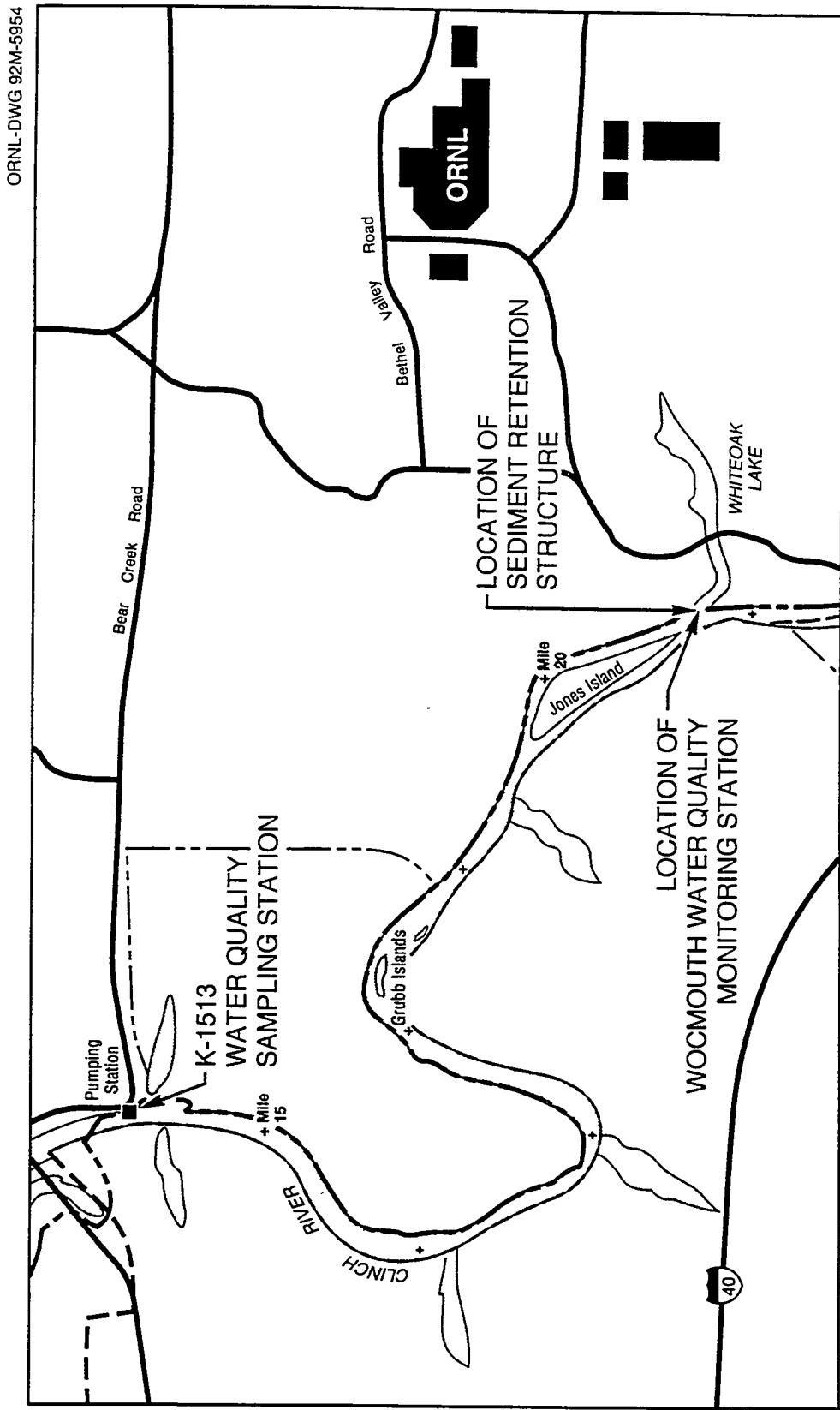


Fig. 1. Site map including location of sediment-retention structure and monitoring station.

1.2 WOCE SITE CHARACTERIZATION

1.2.1 Phase I Sediment Sampling

Sediment grab and core samples were obtained from the lower portion of WOCE in summer 1990 as part of Phase 1 of the Clinch River Remedial Investigation (CRRI). Analysis of these samples revealed the presence of higher than expected levels of ^{137}Cs activity in near-surface (top 10 cm) sediments (Blaylock et al. 1993). Cesium-137 (half-life is 30 years) is a radioactive isotope historically produced by research reactor operations at ORNL. Mercury, chromium, lead, and ^{60}Co have also been observed in the WOCE sediment samples. Studies in 1979 and 1984 of sediment contamination indicated that the most highly contaminated sediment strata were located between 25 and 50 cm below the sediment surface. The occurrence of these strata had been ascribed to peak historical releases from WOL in the mid-to-late 1950s (Blaylock et al. 1993).

1.2.2 Characterization of WOCE Sediments

Extensive characterization of the WOCE sediments was conducted from August 1990 to May 1991. For sediments located at or near the mouth of WOC, the characterization results indicated that the ^{137}Cs contamination occurred in the upper 1 m of sediment in the main stream channel (Blaylock et al. 1993). The underlying soil layers (soils between 1 m and the bedrock) were found to be uncontaminated (Fig. 2 in Kimmel and Ford 1991).

1.2.3 Characterization of WOCE Surface Water

Water samples from WOCE were also collected as part of the CRRI Phase 1 sampling and the WOCE characterization effort (Blaylock et al. 1993). WOCE surface water carries similar contaminants as found in WOL and its tributaries. Nonradiological inorganic and organic contaminants were not detected in the water column (Blaylock et al. 1993). Particle-associated gamma radiological contamination of WOCE surface waters consisted primarily of ^{137}Cs . Concentrated ^{137}Cs values associated with particles (500 to 3000 pCi/g of suspended matter, 50 pCi/g minimum detectable quantity) and dissolved in the water (1 to 40 pCi/L of water, 0.5 pCi/L minimum detectable quantity) declined slightly with downstream distance in the embayment. These particle-associated values were similar to the average values observed for surface sediments in WOCE (Blaylock et al. 1993). However, ^{137}Cs concentrations were highly variable at the WOC mouth, fluctuating greatly due to WOC discharge and extent of dilution from the Clinch River. Concentrations of other radionuclides have also been observed to fluctuate with water flow conditions at the mouth of the embayment. In the Clinch River, radiological contaminants appear to be rapidly diluted by Clinch River flows, and they are normally not detectable a short distance (1 km) downstream within the Clinch.

1.3 OBJECTIVES

The primary objective of the Water Quality Monitoring Project for the WOCE time-critical CERCLA removal action was to assess and document the impact to water quality before, during, and after the construction of the sediment-retention structure. Construction using normal excavation techniques was not possible because of the ^{137}Cs contamination of the sediments. Construction activities were designed specifically to minimize the disturbance,

resuspension, and off-site transport of contaminated sediments. This primary objective, summarized in the *White Oak Creek Embayment Time-Critical CERCLA Removal Action Water Quality Monitoring Plan* (Kimmel and Ford 1991), defined the parameters of the data collected in association with construction activities.

The characterization efforts conducted in 1990 and 1991 (Sect. 1.2) indicated that the WOCE contamination is primarily a result of ^{137}Cs accumulation in the embayment sediments. Therefore, monitoring activities associated with construction activities initially focused on

1. determination of ^{137}Cs activity in the water as a direct indicator of contaminated sediment disturbance and transport at the construction site;
2. daily composite-sample determination of suspended sediment concentrations and continuous monitoring of turbidity as additional indicators of sediment disturbance and transport at the WOC mouth;
3. continuous monitoring of standard water quality variables (pH, specific conductance, water temperature, and dissolved oxygen concentration) at the WOC mouth; and
4. monitoring of ^{137}Cs levels at the K-25 Site water supply intake (K-1513) located at CRM 14.5, 8.8 river km downstream from the mouth of WOC.

Construction activities that had a higher probability of disturbing contaminated sediment were identified prior to construction. The focus of the monitoring efforts addressed the specific requirements of each phase of construction (Table 1). Other natural sediment-disturbing forces, such as seasonal movement of suspended sediment by storms, were assessed by comparison of continuous monitoring results during construction with (1) monitoring results from periods when no construction occurred (Appendix A) and (2) monitoring data from water releases over WOD, upstream from the site, for the same time frame (Fig. 2 and Appendix B). Section 2 addresses specific sampling and analysis methods. Sections 3 and 4 present results and discuss the impact of each activity relevant to the monitoring project objectives.

Table 1. Chronology of construction activities monitored in association with the WOCE time-critical CERCLA removal action

Date	Title for activity	Description/discussion
05/31/91	Monitoring station established	Establish locations for collection of water samples and monitoring during later sediment-retention structure construction. Background water samples composited and collected daily with water-quality monitoring data and stage height recorded continuously from this date throughout life of the project.
6-8/91	Construction and baseline monitoring	Site preparation and other nonsediment-disturbing activities.
8/20-27/91	First sediment-disturbing activities	Placement and driving of sheet pile walls into the WOC streambed. Water sample collection conducted to detect resuspension of contaminated sediments associated with this construction activity (moderate to low potential for sediment disturbance).
8/27/91	Coffer-cell closure	Effective control of WOCE sediments.
9/6/91	Composite sampler operation	ORNL-ESP maintenance and composite sample collection from the WOC mouth and K-1513 sites commences.
9/10/91	Coffer-cell construction	Sheet and H-pile work completed.
9/17/91	Composite sampler operation	WOC monitoring station relocated, and new monitoring equipment installed.
9/18-10/8/91	Rock armoring	Water sampling associated with shoreline and discrete monitoring (high potential for sediment disturbance).
10/7/91	Composite sampler operation	Composite sampler operation continued. Water-quality monitoring discontinued.
01/24/92	Composite sampler operation	Monitoring station relocated to mid WOCE mouth.
2/7-2/24/92	Jet grout	Initial jet grout test work (moderate to low sediment disturbance, high pH disturbance).
3/7-25/92	Jet grout	Production with sediment heaving (low sediment disturbance, high pH disturbance potential).
3/26 & 4/1/92	Dredging	Removal of excess sediment from center cell of dam (high sediment disturbance).

Table 1 (continued)

Date	Title for activity	Description/discussion
05/31/91	Monitoring station established	Establish locations for collection of water samples and monitoring during later sediment-retention structure construction. Background water samples composited and collected daily with water-quality monitoring data and stage height recorded continuously from this date throughout life of the project.
3/27 & 4/5	Concrete cap	Installation of concrete cap (low sediment disturbance, high pH disturbance).
4/4–4/10/92	Rock anchor drilling	Installation of rock anchors (very high sediment disturbance).
4/14/92	Composite sampler operation	Sediment-retention structure complete. Water sample collection and water-quality sampling reduced to least weekly. Water-quality monitoring discontinued.
7/29/92	Composite sampler operation	Postconstruction monitoring complete. No further samples collected for project.

2. MATERIALS AND METHODS: SAMPLE COLLECTION, ANALYSIS, AND REPORTING

The methods for accomplishing the monitoring objectives listed above were modified for each sediment-disturbing construction activity. The schematic for continuous monitoring was established prior to initiation of construction. Guidance for real-time monitoring of specific activities was provided by internally distributed statements of work (Ford 1993a), which are summarized below.

Water samples were collected in support of project objectives. Monitoring parameters for the WOC mouth site are listed in Sects. 2.2 and 2.3. Specific details regarding the continuous monitoring stations, data and sample retrieval and equipment maintenance and calibration are found in Sect 4.1 of the Water Quality Monitoring Plan (Kimmel and Ford 1991).

The sampling strategy was modified to address the conditions of specific construction activities. Quality Assurance/Quality Control (QA/QC) requirements for field sampling are found in Sects. 4.4.3 and 5.4 of the Water Quality Monitoring Plan (Kimmel and Ford 1991). Field and analytical data quality objectives were focused on the monitoring requirements for specific construction activities, as described in the activity-specific statements of work (SOWs) (Ford 1993a).

Weather conditions, equipment function, and a description of monitoring activities, as well as certain field measurements, were recorded in field notebooks or on specially designed data forms. All entries into field notebooks followed the standard operating procedure (SOP) "Data Entry and Recording of Technical Information" (SOP-1, addendum to ES/ER/INT-72). Specific precautions regarding the detection of any material resuspended by construction activities and potentially contaminated with ^{137}Cs and other particle-reactive contaminants were included in the activity-specific SOWs (Ford 1993a).

2.1 MONITORING STATIONS, STRATEGY, AND METHODS

Composite water sample collection stations were established at the WOC mouth (CRM 20.8) and at the K-1513 water intake structure (CRM 14.5). The monitoring station at the WOC mouth consisted of two PVC pipes in the embayment mouth at mid channel. These pipes served as a stilling well, a composite-sample collection point, and a platform for in situ monitoring equipment. The data logging equipment, connected to monitoring instrumentation submersed on these platforms, was housed in an onshore building.

Composite water samples were collected from the two stations (Table 2) and submitted for determination of particle-associated and total ^{137}Cs , total suspended solids (TSS), turbidity, and pH for 24-h composite water samples. Water quality monitoring for temperature pH, dissolved oxygen content, and water stage height was also conducted at the WOC mouth station. Monitoring of 24-h composite sample pH began during jet grout activities.

Table 2. Requested analyses and procedures for water-quality monitoring in association with the WOCE time-critical CERCLA removal action.

Analysis	Container type (matrix/field preservative)	Analytical procedure
Total suspended solids	1-L HDPE ^a bottle (residue/chill)	EPA 160.2 ^b
pH	1-L HDPE bottle (water/chill)	EPA 150.1 ^b
Turbidity	1-L HDPE bottle (water/chill)	EPA 180.1 ^b
Gamma spectroscopy (total, pCi/L)	1-L Marinelli beaker (water/acidified)	EPA 901.1 ^c
Gamma spectroscopy (particle- associated, pCi/g)	Cartridge filter (residue/filter, chill)	EPA 901.1 ^c Ford 1993a

^aHDPE = high-density polyethylene.

^bEPA 1980.

^cEPA 1979.

Note: Sample analysis per site, per date to be performed by ORNL-ACD following sample delivery.

The general strategy for all sampling focused on monitoring resuspended materials rather than collecting a given number of samples per construction event. The intent was to sample a sediment or cement-grout plume, presuming that all samples were collected from a visible plume with a single point source and constant rate of generation. Sample-collection conditions, influenced by river flows, determined qualitatively, and visual extent of the plume on the surface, were as follows:

1. Under high flow conditions (hydroelectric generation at Melton Hill dam), water quality data and sample collection occurred first within a few meters of the plume generation point, second at approximately 10 m downstream, and finally at approximately 100 m downstream.
2. Under baseline flow conditions (no generation from Melton Hill dam), a series of samples were collected over a given period from a stationary point representative of the plume.

For either set of conditions, the optimum rate of sample collection was never more than 3 samples per hour. Actual timing, frequency, and distance of sample collection from construction activities were determined by the sampling team leader. The specific construction activities monitored are listed in Sect. 1.4 and Table 1. Due to the time-critical nature of these data, all radiological sample results during construction monitoring were requested with a 24- to 48-h turnaround. Data were returned directly to the project coordinator (Ford 1993a). Results were reviewed by the project coordinator and evaluated relative to construction-specific SOWs regarding monitoring activities (Ford 1993a).

2.2 WATER QUALITY MONITORING VARIABLES

Water quality variables monitored continuously from the WOCE station with multiparameter monitoring instruments (Hydrolab Corporation, Austin, Texas) included temperature, pH, conductivity, and dissolved oxygen. Monitoring was modified to meet the objectives of particular contaminant release events. In accordance with manufacturer's instructions, Hydrolab instruments were calibrated to traceable standards. Deviations from calibration for particular instruments were recorded on calibration log sheets. Calibration for continuous monitoring devices was conducted biweekly. Hydrolab instruments used for monitoring from a boat were calibrated prior to sampling, and the calibrations were checked upon return to the laboratory.

The initial focus of this monitoring study included continuous nephelometric monitoring of turbidity in situ to detect construction-related events. However, during the early portions of the monitoring task, the limitations of continuous turbidity measurements were identified, including difficulty in calibration, nonavailability of replacement parts for the instrument, and relatively high ambient turbidities at the WOC mouth. Calibration of the in situ nephelometer was not maintained, and nephelometric monitoring data are therefore not reported. Turbidity was determined in the laboratory using a Hach instrument for each sample collected for this project (Sect. 2.3).

Data on water discharged from the WOL dam from June 1991 through July 1992 in cubic feet per second (Fig. 2) were obtained from the ORNL Environmental Restoration (ER) Division Waste Area Grouping 2 (WAG 2) project. Monthly and quarterly radiological and water quality data were also obtained from the ORNL Environmental Monitoring and Compliance Group. These data provide information on sources of suspended solids and contaminants that contributed to observed values at the WOC mouth as well as comparable water quality monitoring information for this project.

2.3 REQUESTED ANALYSES AND PROCEDURES

All samples were analyzed as specified in Sect. 4.3 of the Water Quality Management Plan (Kimmel and Ford 1991) (Table 2). Determination of pH was added during jet grouting activities (Communication WOCE\030692A.SAP in Ford 1993a). Samples submitted to the ORNL Analytical Chemistry Division (ACD) Inorganic Analysis Group were analyzed using NPDES procedures 180.1 for turbidity, 160.2 for TSS, and 150.1 for pH (EPA 1979).

Samples submitted to the ORNL-ACD Low-Level Radiological Analysis (LLRA) group were analyzed using Environmental Protection Agency (EPA) method 901.1, gamma-spectrometry (EPA 1980). Additional field samples were analyzed for gamma spectrometry by the Environmental Sciences Division (ESD) Radiochemical Analysis Laboratory (RAL). All gamma spectrometry samples were placed on the detectors for 100-min counts. Results reported in either picocuries or becquerels per unit mass or volume were converted to picocuries for this report (1 Bq = 27.03 pCi). Preparation and use of appropriate standard geometries for the samples to be counted were performed by the analytical laboratories.

Particle-associated ^{137}Cs results (in picocuries per gram) from gamma-spectrometry of high-capacity cartridge filters may greatly exceed ^{137}Cs results for total ^{137}Cs activity (in

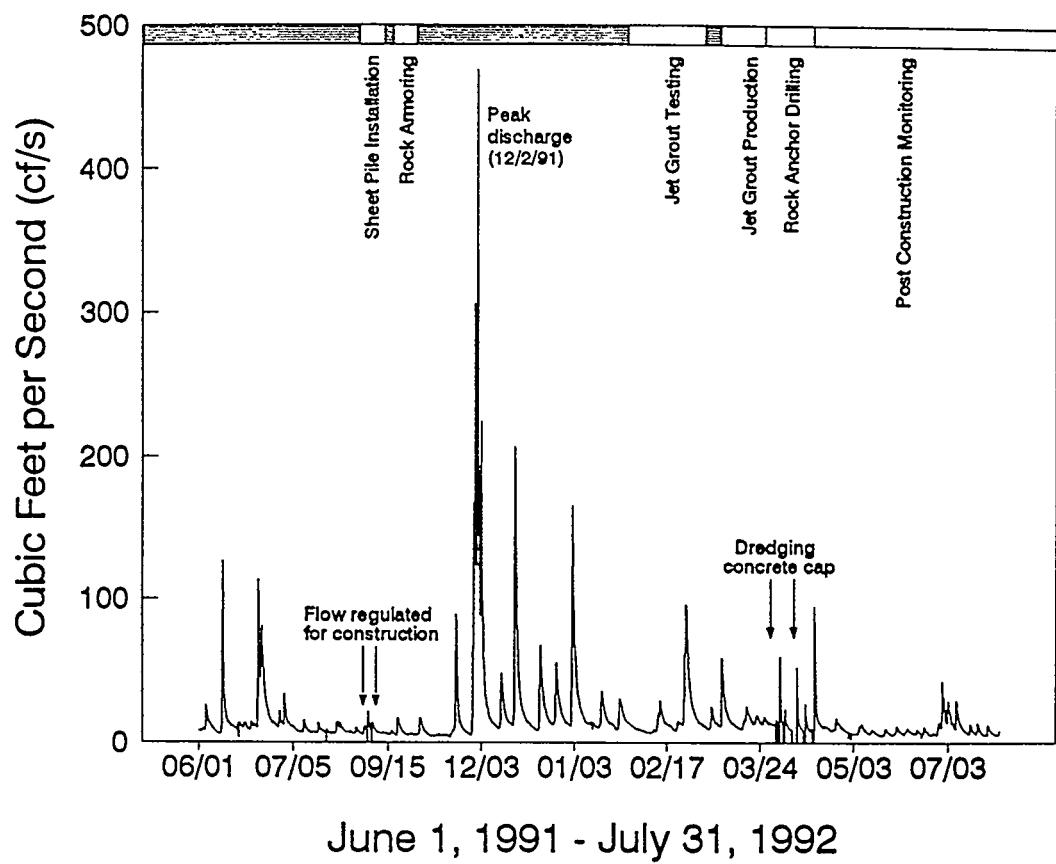


Fig. 2. Continuous plot of hourly average water discharge from the White Oak Lake Dam, June 1991 through July 1992.

picocuries per gram). The use of cartridge filters for surface water samples has provided much improved detection limits, allowing for direct comparison of surface water and surface sediment contaminant concentrations. However, data for water placed in Marinelli beakers of water for gamma spectrometry are the basis for comparison with regulatory limits.

2.4 PREANALYTICAL PROCESSING

Samples collected through use of a time-proportional composite sampler set to collect 0.1 L of sample every 10 to 30 min, depending upon monitoring requirements, were apportioned in the field into four aliquots, as summarized in Table 2. The first and second aliquots consisted of duplicate prelabeled 1-L I-Chem bottles submitted for turbidity and TSS analyses. For the third aliquot, 900 mL of well-mixed sample was placed in a prelabeled 1-L Marinelli beaker and acidified. The fourth aliquot, which consisted of sample material remaining in the sample carboy, was processed through a cartridge filter. The third and fourth aliquots were analyzed by gamma spectrometry.

2.5 CHAIN OF CUSTODY

Sample custody was maintained and documented as specified in guidance SOWs (Ford 1993a) using standard CRRI procedures (ES/ER/INT-72) and the Water Quality Management Plan (Kimmel and Ford 1991). Chain-of-custody definitions and procedures followed those of "Sample Custody Procedures" (Sect. 10.3 in Energy Systems 1990) and Energy Systems ESP-500 (Kimbrough et al. 1990).

2.6 SAMPLE IDENTIFICATION

The sample identification codes used for this project were specified in weekly communications from the project coordinator to the environmental sampling teams (Ford 1993b). All results reported from the analytical laboratories used this standard sample identification format.

2.7 QUALITY ASSURANCE/QUALITY CONTROL

QA/QC procedures for this project are detailed in Sect. 5.4 of the Water Quality Management Plan (Kimmel and Ford 1991). Laboratory QA/QC procedures are discussed in Communication WOCE\070891A.SOW (Ford 1993a). Routine field quality control samples, consisting of field duplicates and sampling device rinse water samples, were collected as specified in sample identification communications (Ford 1993b). All QA/QC field data for this project are reported in Appendix E. Records management for this project was specified in Sect. 5.5 of the Water Quality Management Plan (Table 4 in Kimmel and Ford 1991).

3. RESULTS

WOD discharge values in cubic feet per second, for the period June 1991 through July 1992, are presented in Fig. 2. This plot illustrates the highly variable nature of WOD discharges. WOD flows were reduced to nearly zero during critical construction phases, including installation of final sheet pilings, dredging of excess material from inside the structure, and installation of the concrete cap. Typically, Melton Hill Dam discharges dilute those from WOD by a ratio of 50 to 500 within the Clinch River, depending upon flows. Discharges from WOC may not be fully mixed with the Clinch River and the full dilution not observed for 10 to 15 km downstream from the WOC mouth (Dennis Borders, ORNL, personal communication).

3.1 COMPOSITE SAMPLING

Total and particle-associated ^{137}Cs , and TSS for 24-h composite water samples collected from stations located approximately in the WOC mouth (Fig. 3) and at the K-1513 water intake structure (Fig. 4) are summarized in Table 3. Monitoring results from the analytical chemistry laboratories are presented in Appendix A. Results for turbidity and TSS analyses are seasonally variable, reflecting changes in discharges from WOC.

Review of QA/QC data (Appendix E) indicated that (1) duplicate samples for both composite and grab samples had standard error values of 10% or less, (2) rinse blanks for field data throughout this project did not yield detectable values of residual contamination, and (3) rinse blanks for composite samplers initially were low but showed some elevated levels of contaminants during the spring (Appendix E). The increasing rinse-composite-sampler rinse-blank results may be the result of the inefficient cleaning methods used for composite sampling equipment.

Radiological data collected during the preconstruction period at the WOC mouth show low but measurable concentrations of ^{137}Cs leaving WOC during normal flow conditions prior to coffer-cell closure. These values are comparable with results from the WOD monitoring station collected over the same time period (Kornegay et al. 1992 and Appendix B). These values dropped and remained low during the early fall of 1991 (Fig. 3). Levels of ^{137}Cs and TSS concentrations rose during the late fall but declined during the winter and remained low, normally below the counting error throughout December, January, and part of February (see Figs. 3a, 3b, 3d, and 3e). The peak total ^{137}Cs value for K-1513 was observed in conjunction with a high volume discharge from WOL (Fig. 2), presumably associated with a rain event in the WOC watershed. With this exception, data from the K-1513 station during the fall and winter showed little or no detectable ^{137}Cs concentrations (Figs. 4a, 4b, 4d, and 4e).

There were increases in radiological results from 24-h composite samples coincident with jet grouting, concrete cap construction, sediment dredging, and rock anchor drilling at the WOC mouth station (Figs. 3a and 3b). Dredging and drilling activities also increased the ^{137}Cs levels at the K-1513 station (Figs. 4a and 4b). Levels of radiological contaminants at both monitoring stations dropped following completion of the sediment-retention structure (Figs. 3a, 3b, 4a, and 4b; Appendix A).

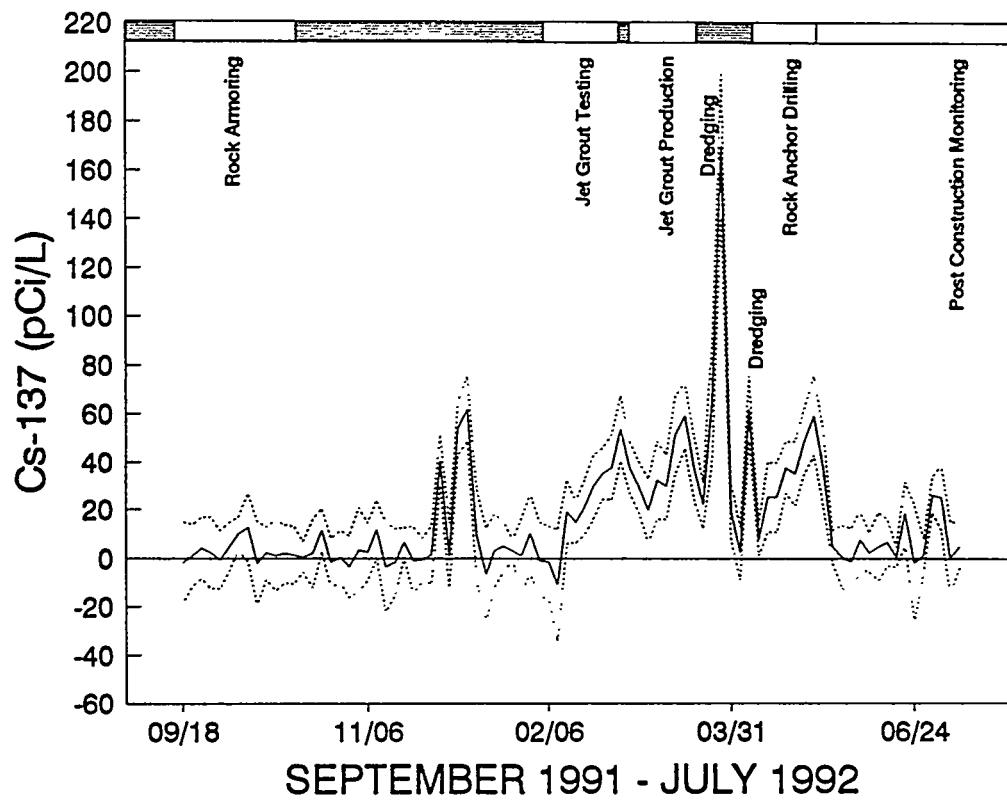


Fig. 3a. Plot of total ^{137}Cs (pCi/L) in 24-h composite samples at the mouth of White Oak Creek.

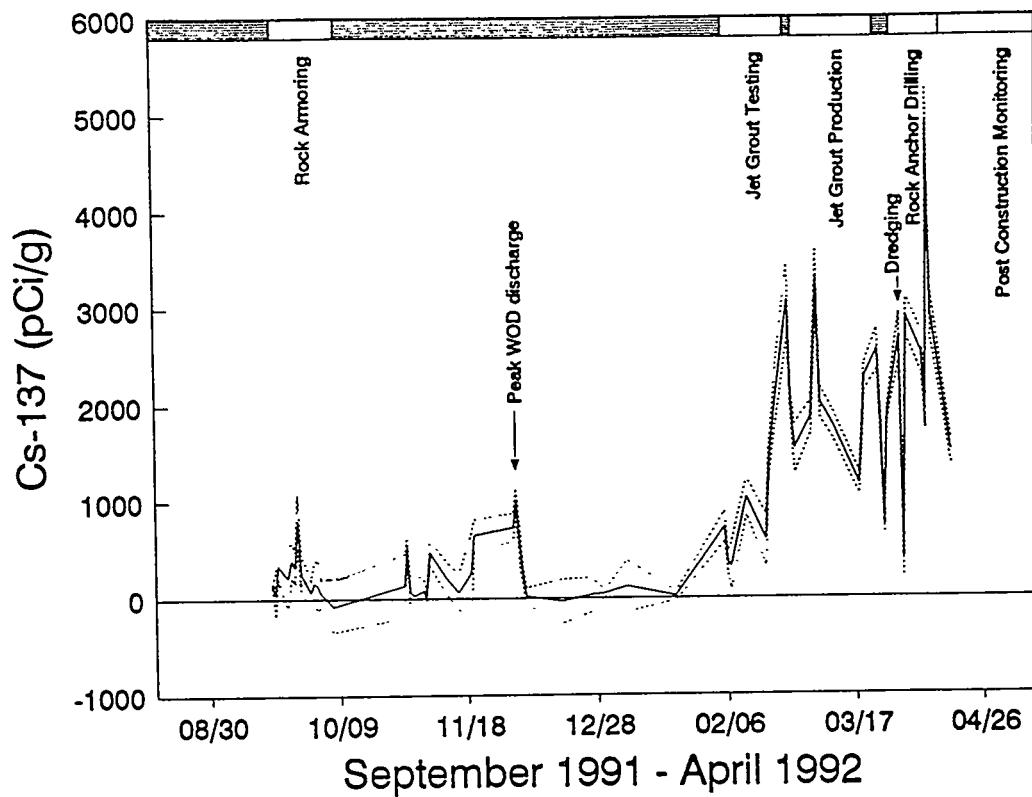


Fig. 3b. Plot of particle-associated ^{137}Cs (pCi/g) in 24-h composite samples at the mouth of White Oak Creek.

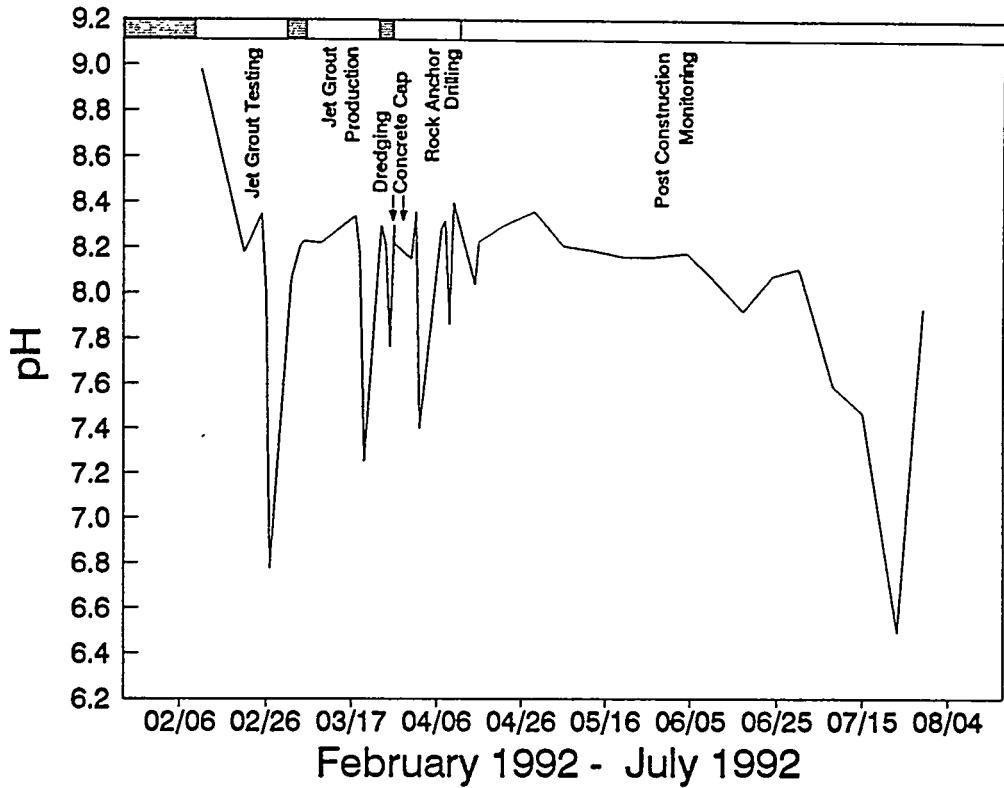


Fig. 3c. Plot of pH in 24-h composite samples at the mouth of White Oak Creek.

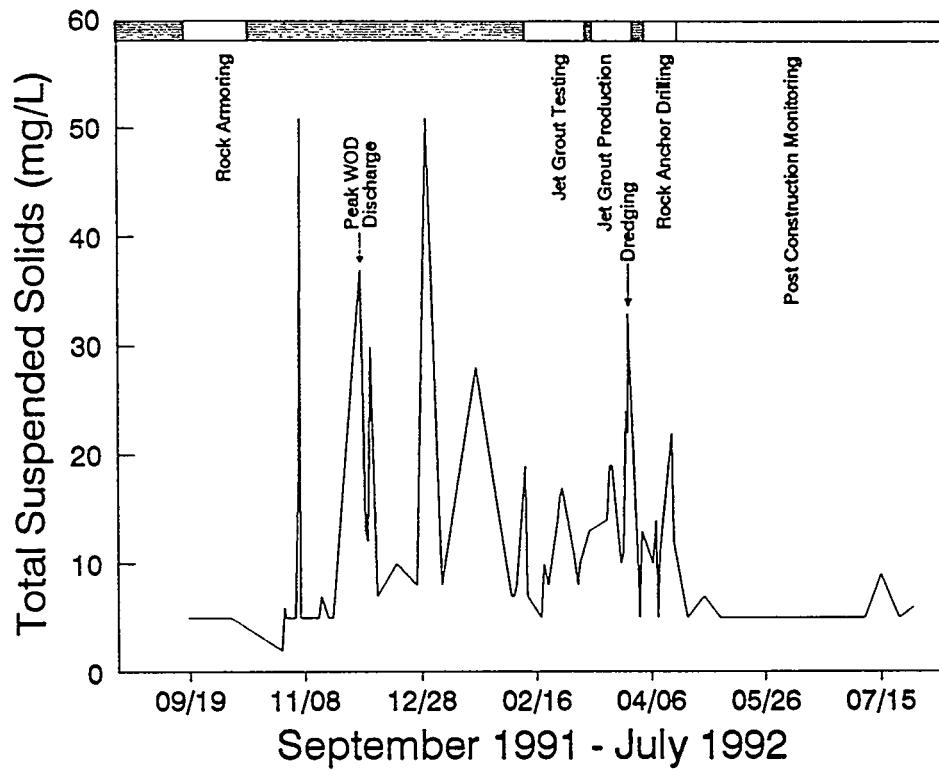


Fig. 3d. Plot of total suspended solids (mg/L) in 24-h composite samples at the mouth of White Oak Creek.

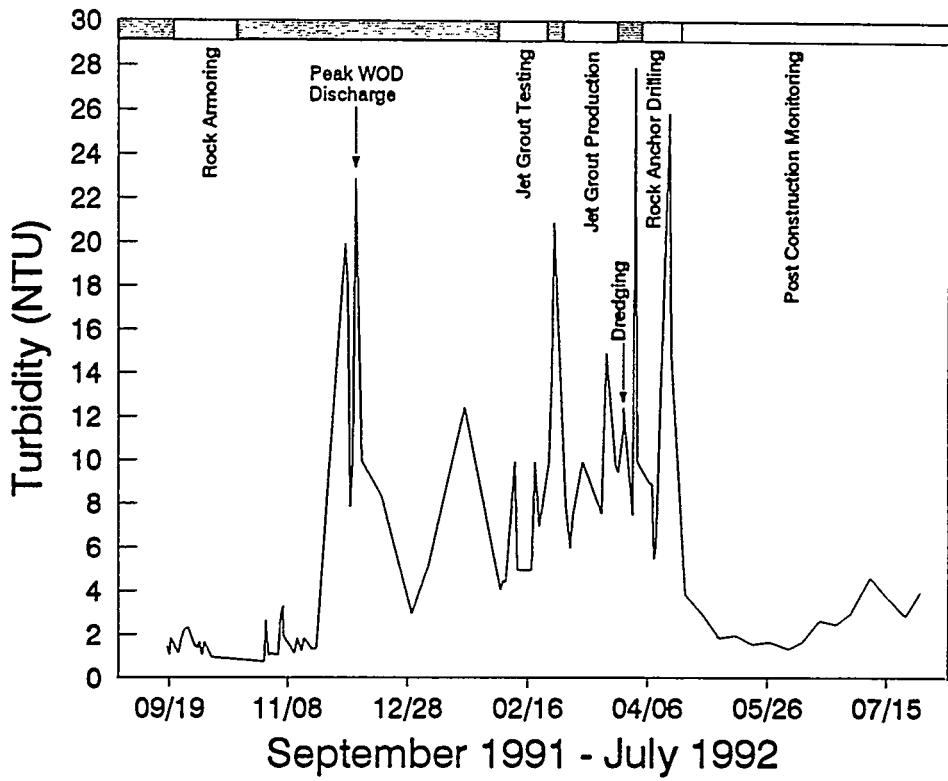


Fig. 3e. Plot of turbidity (NTU) in 24-h composite samples at the mouth of White Oak Creek.

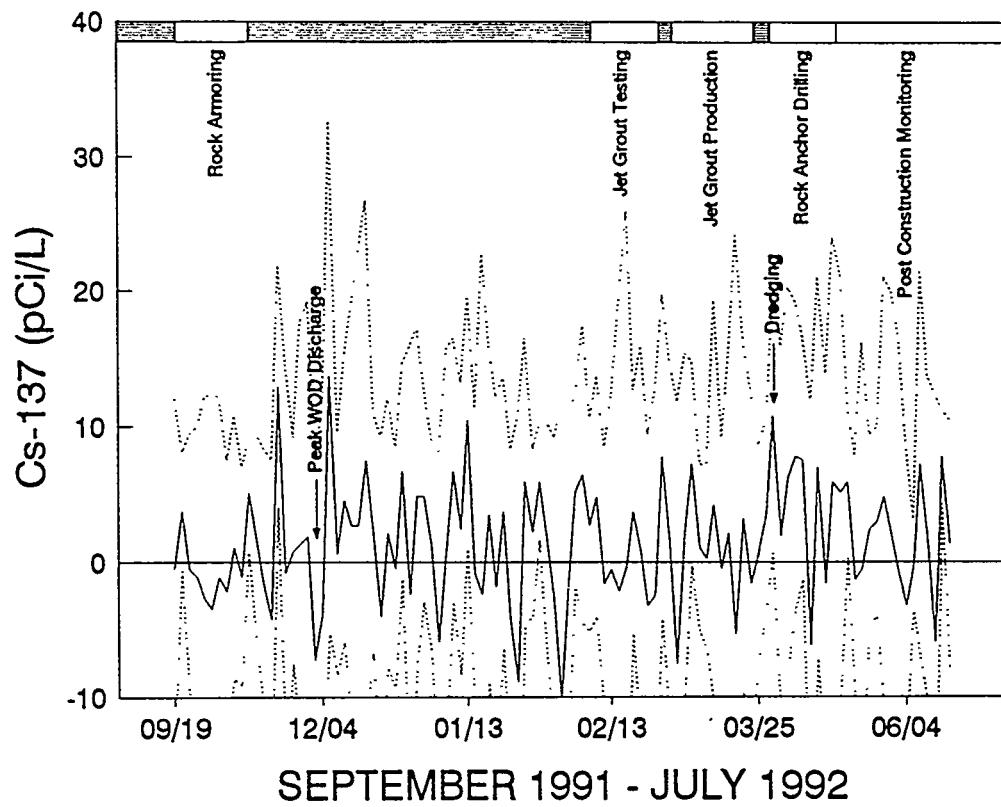


Fig. 4a. Plot of total ^{137}Cs (pCi/L) in 24-h composite samples at the K-1513 water intake structure.

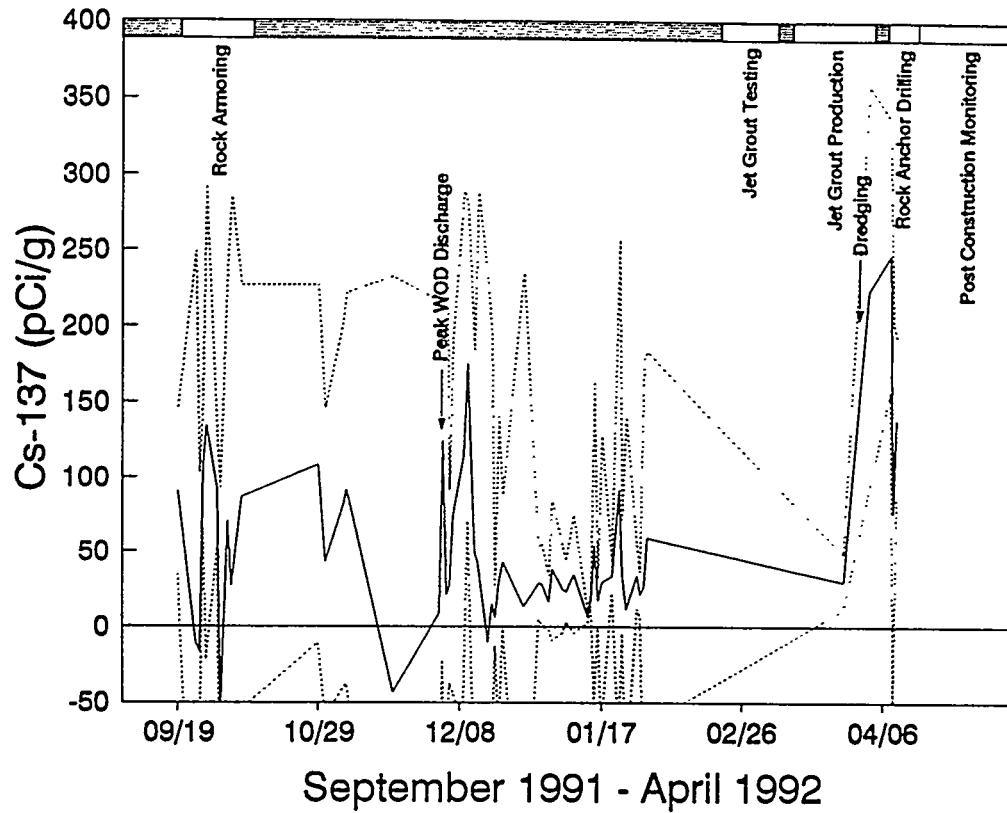


Fig. 4b. Plot of particle-associated ^{137}Cs (pCi/g) in 24-h composite samples at the K-1513 water intake structure.

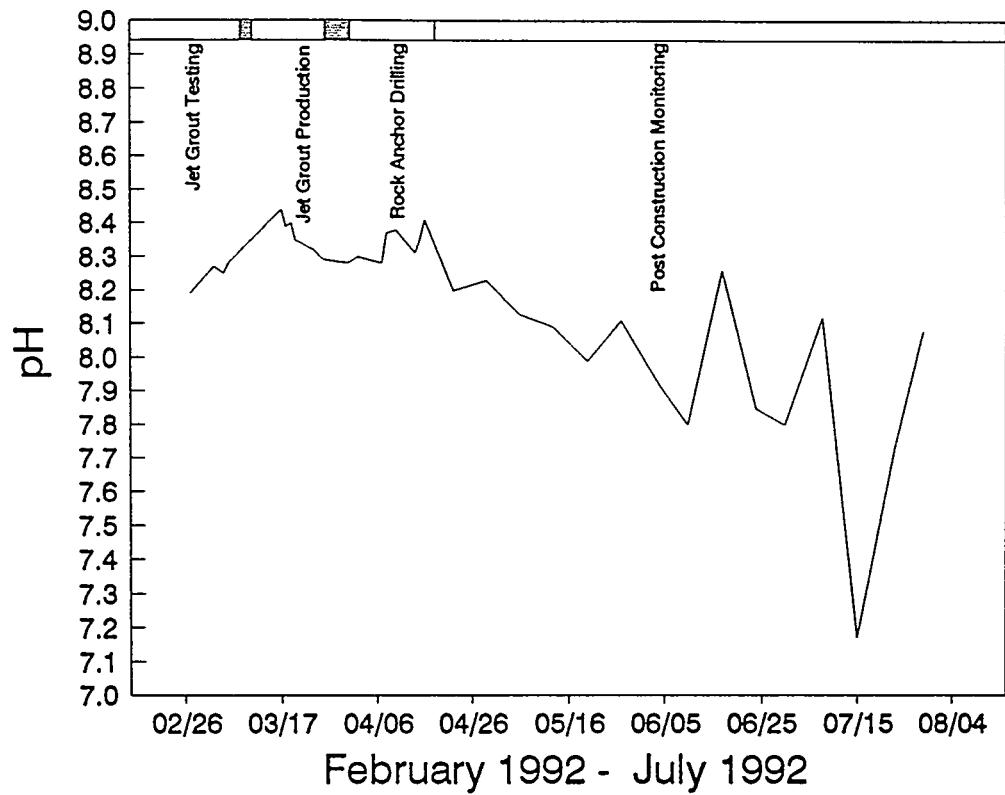


Fig. 4c. Plot of pH in 24-h composite samples at the K-1513 water intake structure.

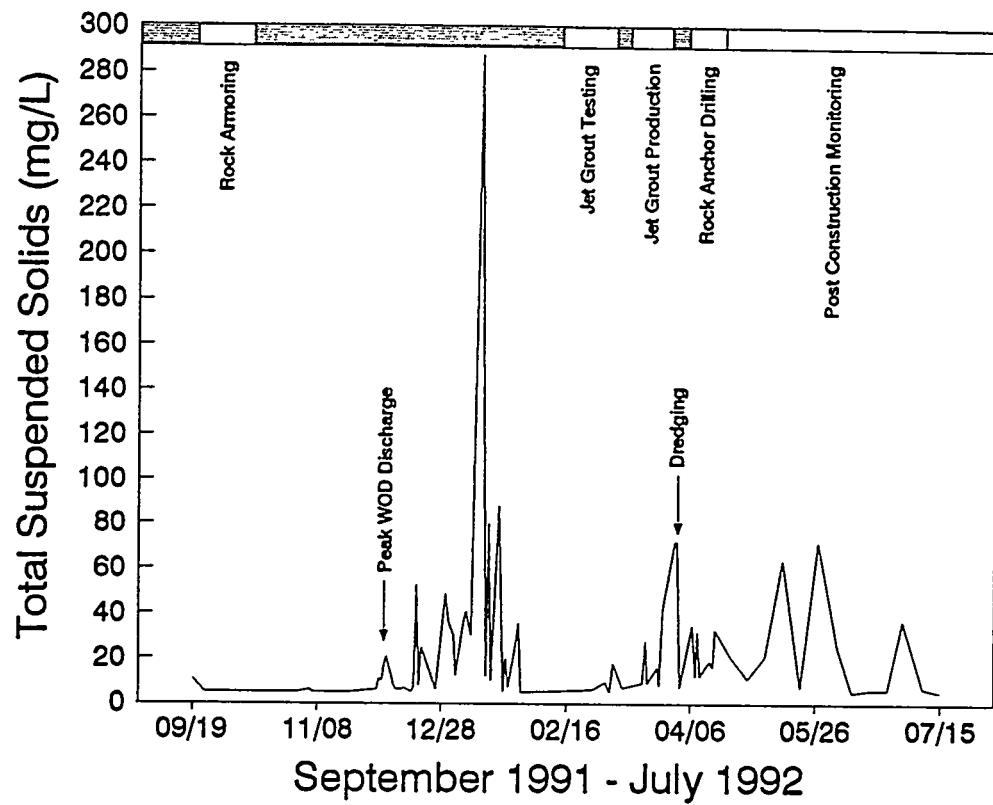


Fig. 4d. Plot of total suspended solids (mg/L) in 24-h composite samples at the K-1513 water intake structure.

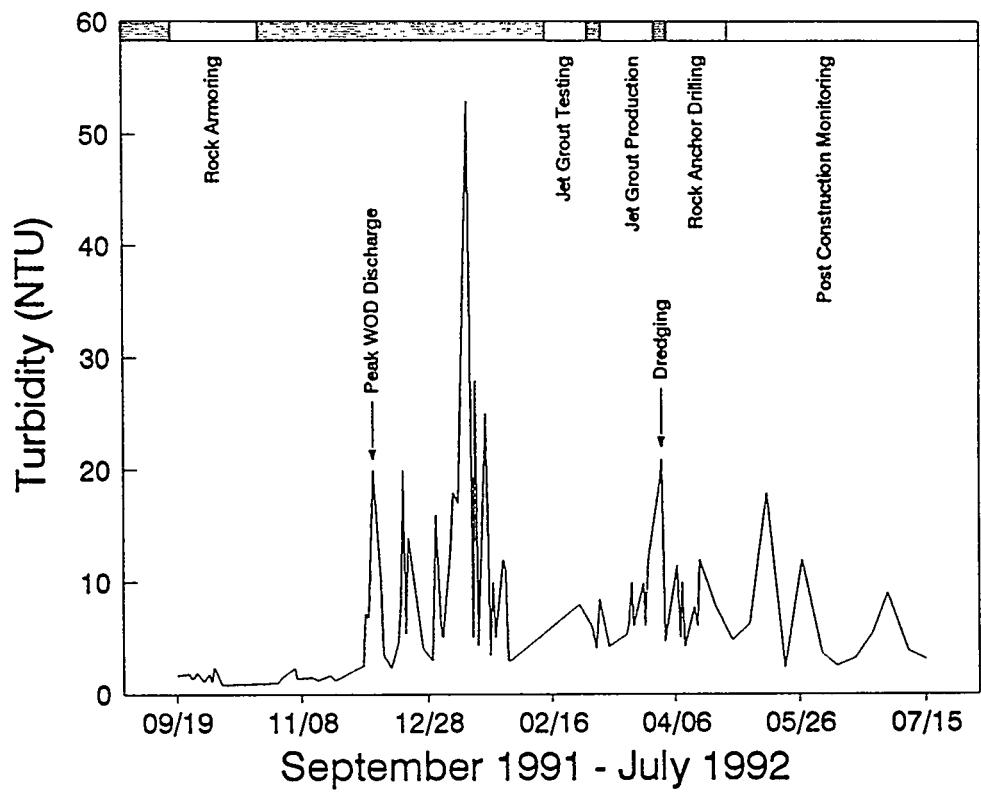


Fig. 4e. Plot of turbidity (NTU) in 24-h composite samples at the K-1513 water intake structure.

Table 3. Water quality sampling results from 24-h composite sampler operations at the K-1513 and WOC mouth stations

Analyte	Number	Maximum	Minimum	Mean	Units
K-1513 (CRM 14.5)					
¹³⁷ Cs (total)	109	13.8	-10.8	1.3	pCi/L
¹³⁷ Cs (particle-associated)	56	247.8	-64.9	51.8	pCi/g
TSS	90	288.0	0.0	22.3	mg/L
Turbidity	88	55.0	0.8	8.4	NTU
WOC mouth (CRM 20.8)					
¹³⁷ Cs (total)	84	170.3	-11.1	16.7	pCi/L
¹³⁷ Cs (particle-associated)	66	4919.5	-540.6	943.3	pCi/g
TSS	84	51.0	2.0	10.3	mg/L
Turbidity	85	28.0	0.8	6.1	NTU

3.2 CONTINUOUS WATER QUALITY MONITORING

Routine water quality monitoring results at the WOC station, including temperature, pH, dissolved oxygen, conductivity, and stage height, are summarized in Table 4 and presented in Fig. 5. All water quality results are found in Appendix C. Data from pH monitoring will be highlighted in Sects. 3.3.3 and 3.3.5. Copies of calibration records for the water quality monitoring equipment are available upon request.

3.3 EVENT-SPECIFIC MONITORING

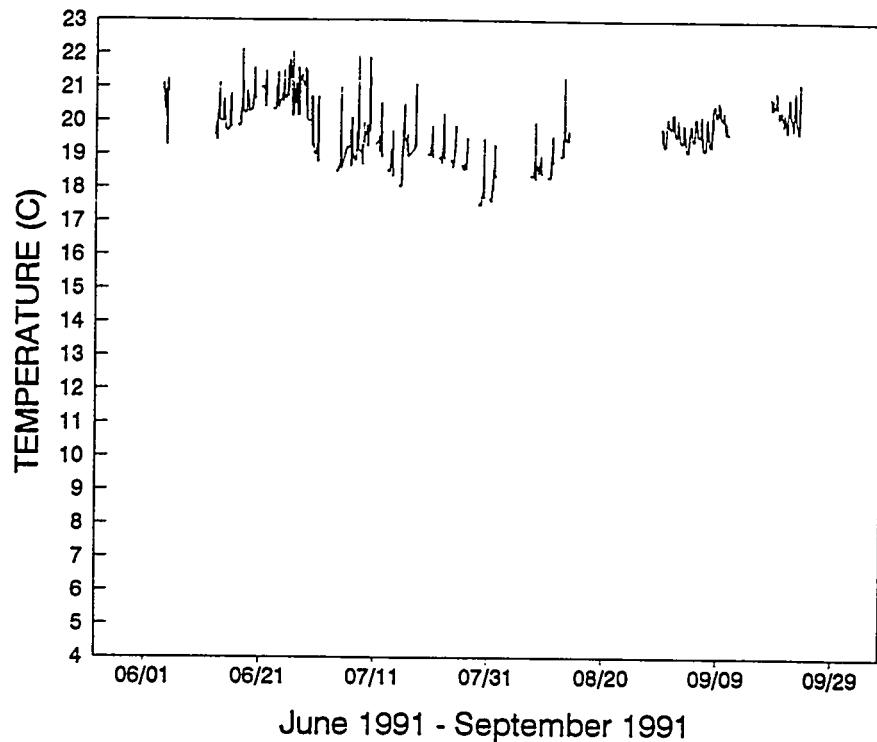
Monitoring results for the various construction activities are presented below. Reasons for monitoring each project phase are as follows:

- Composite water sample collection was initiated to determine reference conditions for the monitoring project, to provide information regarding the downstream transport of contaminants from WOCE due to both natural flows and construction activities, and to evaluate the short-term effectiveness of the structure (Communication WOCE\070891B.SOW in Ford 1993a).
- Sheet- and H-pile driving operations in the WOCE mouth and subsequent restriction of the flow of water into and out of WOCE had the potential for disturbance, resuspension, and release of contaminated sediments (Communication 081591A.SOW in Ford 1993a).
- Rock armoring of the shoreline to prevent erosion involved the placement of large rocks on the sediment surface and had the potential for disturbance resuspension and release of contaminated sediments (Communication WOCE\091791A.SOW in Ford 1993a).

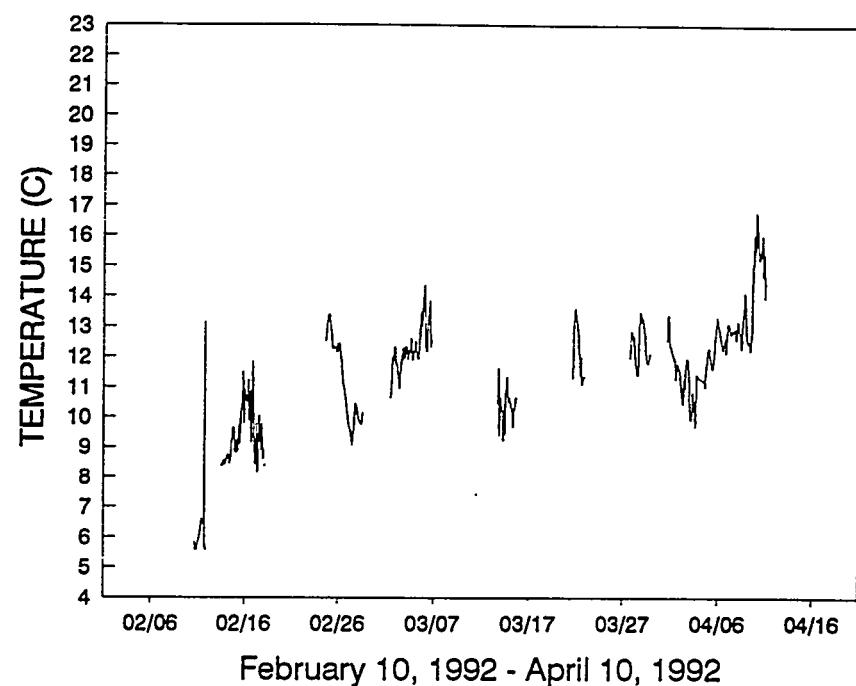
- Jet grout construction activities to reinforce the internal base of the sediment-retention structure had the potential to both disturb sediment and release high-pH grout to the surface water. All solutions with a pH greater than 12.5, such as grout, are classified and regulated by Resource Conservation and Recovery Act (RCRA) as being corrosive (Communications WOCE\030692A.SAP and WOCE\030992A.SOW in Ford 1993a).

Table 4. Water quality sampling results for the WOC mouth monitoring station

Parameter	Number	Maximum	Minimum	Average
June 1991				
Temperature (°C)	366	22.15	18.73	20.40
pH	366	7.15	5.99	NA
Dissolved oxygen (mg/L)	366	8.61	3.89	6.89
July 1991				
Temperature (°C)	353	21.97	17.42	18.95
pH	353	6.87	4.77	NA
Dissolved oxygen (mg/L)	353	9.13	6.20	7.72
August 1991				
Temperature (°C)	167	21.33	18.22	19.16
pH	167	6.76	6.17	NA
Dissolved oxygen (mg/L)	167	6.83	5.04	5.86
September 1991				
Temperature (°C)	354	21.23	19.08	354.00
pH	354	8.35	5.58	NA
Dissolved oxygen (mg/L)	354	11.31	4.98	6.84
February 1992				
Temperature (°C)	238	22.47	4.99	9.75
pH	238	9.50	4.99	NA
Dissolved oxygen (mg/L)	238	22.08	6.38	14.78
March 1992				
Temperature (°C)	244	14.38	9.20	11.94
pH	244	8.84	7.37	NA
Dissolved oxygen (mg/L)	244	18.57	10.92	15.88
April 1992				
Temperature (°C)	205	16.82	9.65	12.57
pH	205	8.96	7.83	NA
Dissolved oxygen (mg/L)	205	18.44	10.25	16.09



June 1991 - September 1991



February 10, 1992 - April 10, 1992

Fig. 5a. Continuous plot of temperature for the water quality monitoring station at the mouth of White Oak Creek.

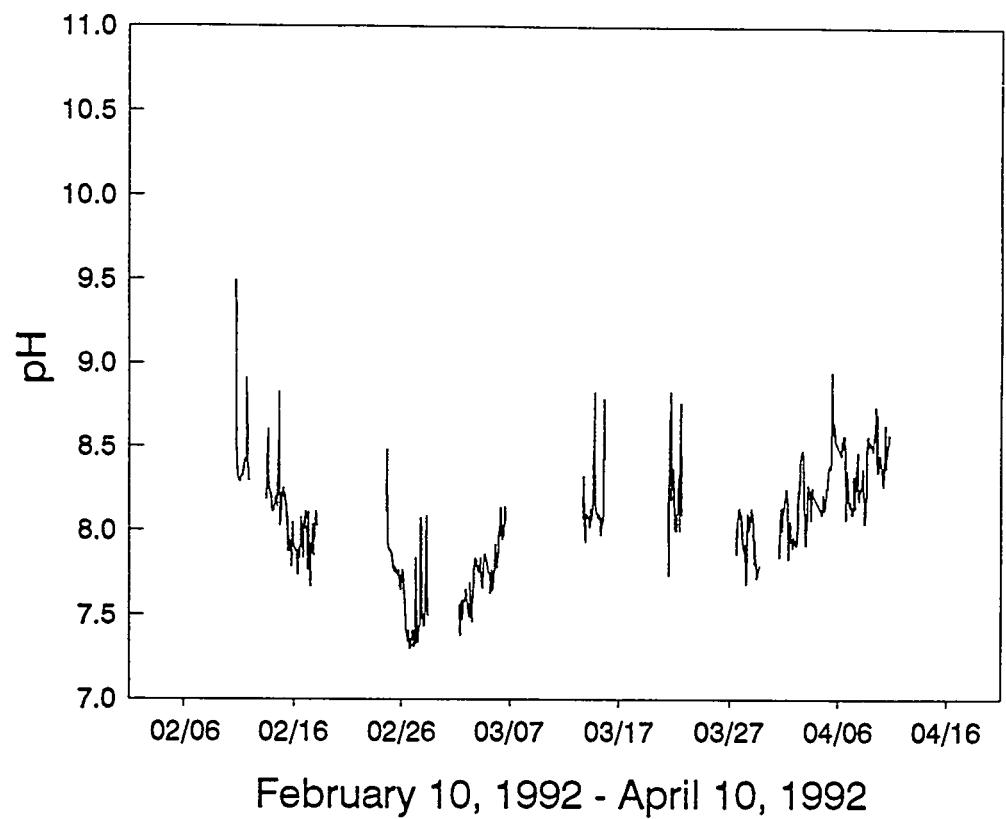
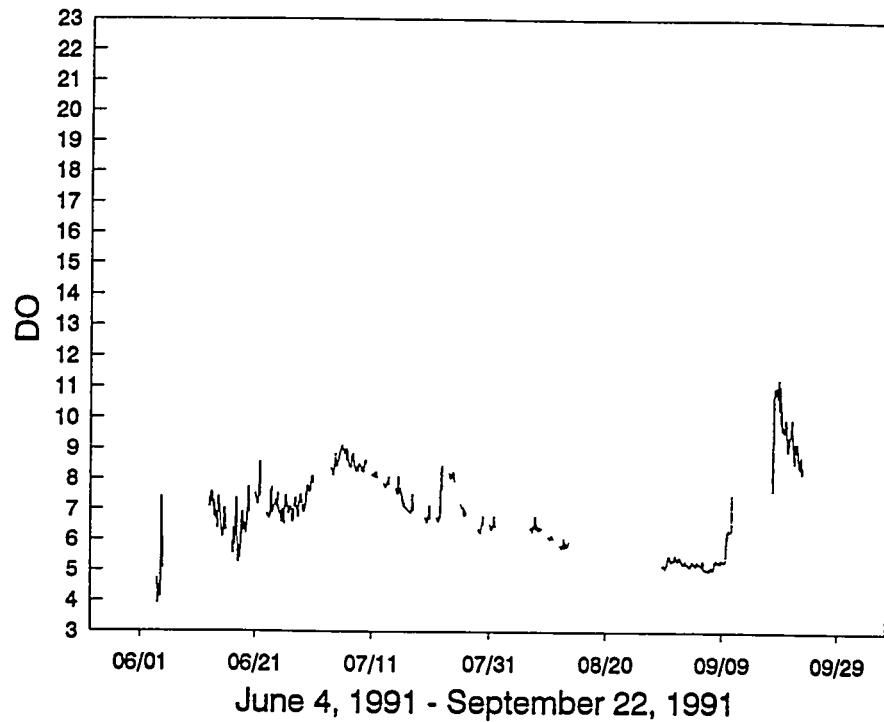
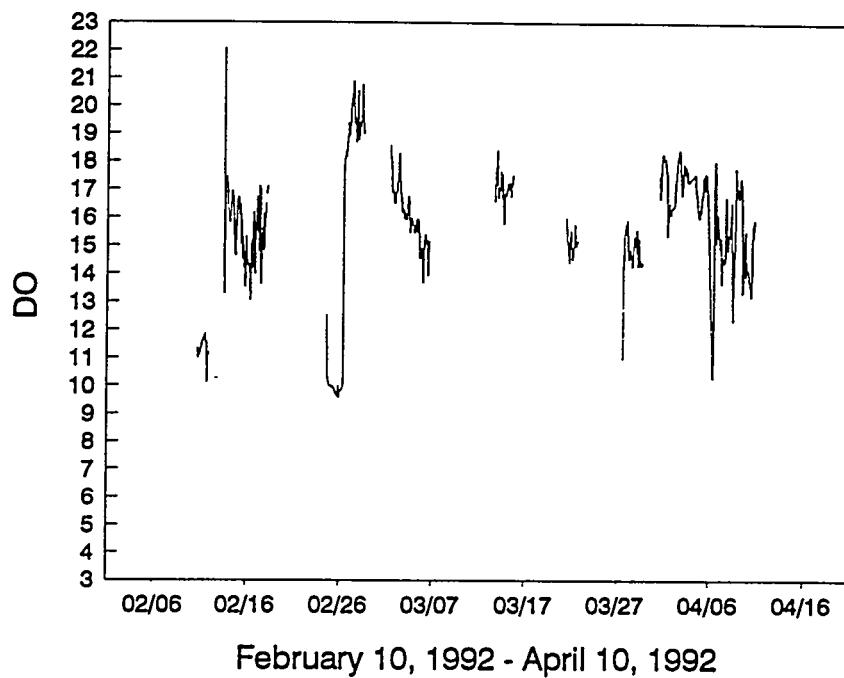


Fig. 5b. Continuous plot of pH for the water quality monitoring station at the mouth of White Oak Creek.



June 4, 1991 - September 22, 1991



February 10, 1992 - April 10, 1992

Fig. 5c. Continuous plot of dissolved oxygen for the water quality monitoring station at the mouth of White Oak Creek.

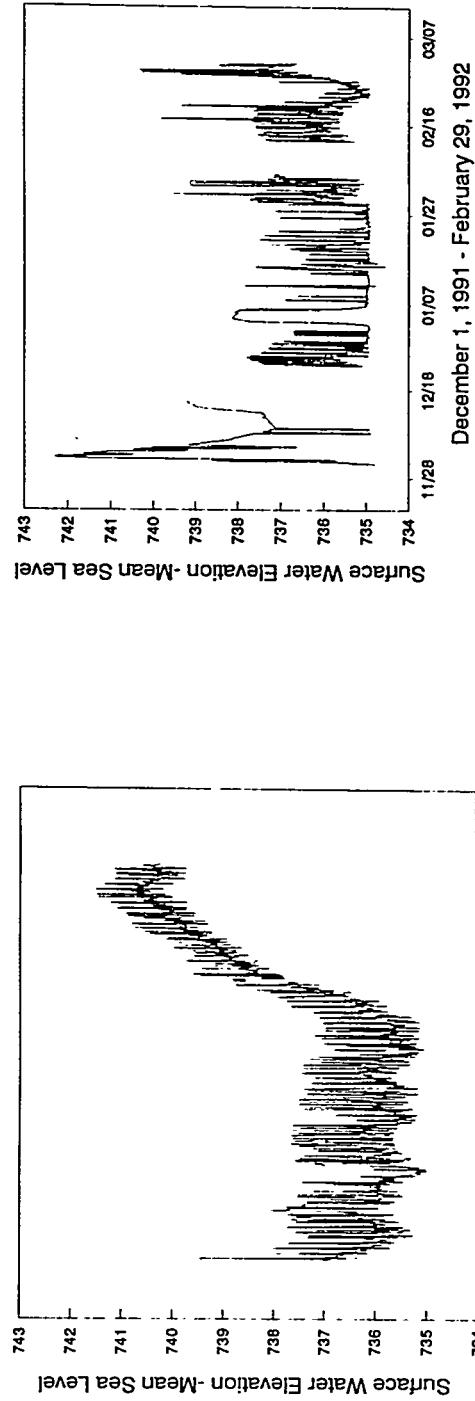
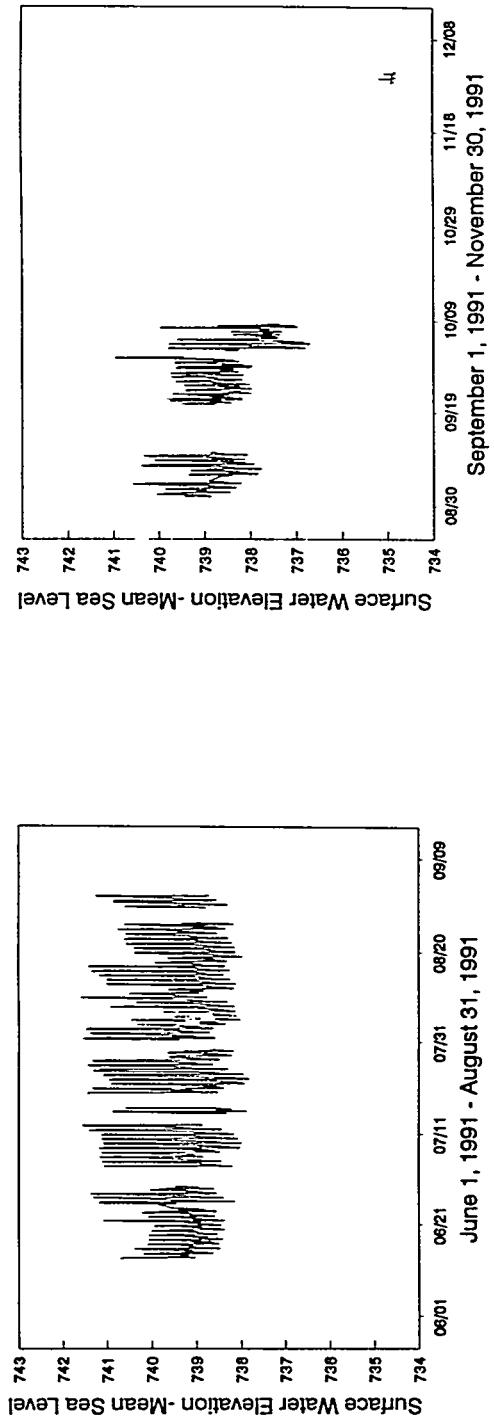


Fig. 5d. Continuous plot of stage history at the mouth of White Oak Creek

Additional construction activities including the following were monitored:

- Surface sediment relocation within the coffer cell was performed to provide adequate space for concrete cap installation following jet grout completion. Monitoring focused on sediment disturbance and transport downstream due to dredge operations (Communication WOCE\032592A in Ford 1993a).
- Concrete cap installation had the potential for release of high-pH cement (RCRA corrosive) materials; monitoring followed the same guidance as that for pH monitoring of jet grout operations (Communication WOCE\030992A.SOW in Ford 1993a).
- Rock anchor drilling and installation had a great potential for disturbance of surface sediments; suspended materials collection followed the same guidance as given for dredging (Communication WOCE\032592A in Ford 1993a).

Rock anchor drilling and installation was the last construction activity monitored for specific sediment-disturbing activities. Monitoring continued for 3½ months after construction activity ceased.

Results from each phase of the construction project requiring on-site, real-time sample and data collection are presented below. All event-specific monitoring data are found in Appendix D.

3.3.1 Sheet Pile Installation

Sheet pile installation in the WOC streambed occurred from August 20 through August 27, 1991. Discharge rates from both the WOD (Fig. 2) and Melton Hill Dam were regulated during the final stages of sheet pile installation to minimize flows and flow changes at the mouth of WOC. Increases in contaminant concentrations were not observed at the WOC mouth during pile-driving operations. All water quality parameters were within values previously observed for this season and were comparable with WOD data for the same time frame (Kornegay et al. 1992 and Appendix B). Contaminant data collected in conjunction with pile driving are presented in Appendix D.

3.3.2 Rock Armoring

Rock armoring of the shoreline was conducted from September 18 through October 8, 1991, to reinforce the banks of rivers and creeks in the vicinity of the sediment-retention structure. Small-scale turbidity plumes were observed by sampling teams during rock armoring of the shoreline at the coffer cell; however, contaminant concentrations did not increase at the WOC mouth in association with these operations. All water quality parameters were within values previously observed for this season and were comparable with WOD data for the same time frame (Kornegay et al. 1992 and Appendix B). Data collected in conjunction with rock armoring are presented in Appendix D.

3.3.3 Jet Grouting

Jet grout activities were conducted from February 10 through March 25, 1992. In-stream pH increased at the mouth of WOC in conjunction with jet grouting activities (Figs. 3c, 5b,

6, Table 5, Appendix D). Twenty-four hour composite sample pH values never exceeded pH 9 during grouting activities (Fig. 3c). Manual recording (Fig. 5b) and continuous monitoring at the site yielded pH maxima near 10 during jet grouting. A single construction-related release resulted in a pH peak of approximately 10.6 for surface waters (Fig. 6). Increases in ^{137}Cs activity during jet grouting in the coffer cell were observed at the WOC mouth (Figs. 3a and 3b). Temperature and dissolved oxygen parameters were within seasonally expected normal values. Increases in ^{137}Cs activity associated with jet grouting were observed at the WOC mouth. No increases in pH or ^{137}Cs activity were observed at K-1513 in association with jet grouting activities (Fig. 4).

Table 5. Summary of parameters, range, and number of observations for samples collected during construction of the sediment retention structure at WOCK 0.0

(Data were collected from February 10 through March 25, 1992.)

Analyte	Number	Maximum	Minimum	Mean	Units
^{137}Cs (particle-associated)	22	3186.4	585.7	1858.6	pCi/g
^{137}Cs (total)	58	324.4	-10.8	110.0	pCi/L
Total suspended solids	22	22.6	6.2	14.3	mg/L

3.3.4 Dredging

Dredging to remove excess sediment from the sediment-retention structure was conducted on March 26 and April 1, 1992. Turbidity plumes were observed in conjunction with dredging activities. Resuspension and transport of contaminated sediment was evident in both the composite sampler and grab samples collected in conjunction with dredging (Figs. 3a and 3b; Tables 3 and 6). Composite samples indicated that ^{137}Cs -contaminated sediment had been released.

Twenty-four-hour composite sampler results for ^{137}Cs activity at both the WOC mouth and K-1513 monitoring stations increased in conjunction with sediment dredging (Table 3). At the WOC station, particle-associated ^{137}Cs values for dredging activity at WOC were elevated by one to two orders of magnitude [170 pCi/L total ^{137}Cs and 2900 pCi/g dry weight suspended solids of ^{137}Cs (Appendix A)] relative to nonconstruction reference levels (Appendix A). Values for K-1513 were also elevated for the time frame, though they were much lower than those in WOC [range 1 to 10 pCi/L for total ^{137}Cs activity, maximum particle-associated $^{137}\text{Cs} = 223$ pCi/g (Appendix A)].

Grab sample results for ^{137}Cs values in surface-water grab samples collected in the immediate vicinity of dredging-sediment plumes in bulk samples ranged from 10 to 324 pCi/L, while particle-associated values ranged from 800 to 7150 pCi/g (Table 6 and Appendix D).

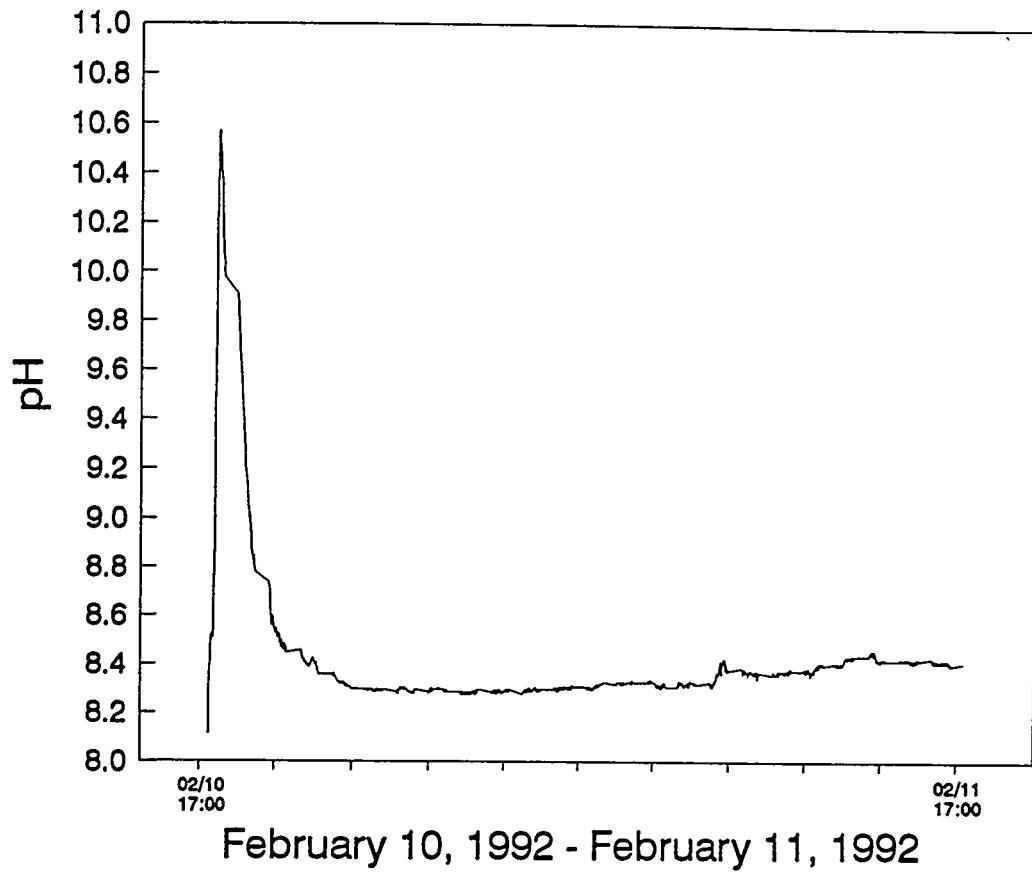


Fig. 6. Continuous plot of pH values for grout released to surface waters.

Table 6. Summary of parameters, range, and number of observations for samples collected during sediment-dredging activities associated with construction of the sediment retention structure at WOCK 0.0

(Data were collected on March 26 and April 1, 1992.)

Analyte	Number	Maximum	Minimum	Mean	Units
¹³⁷ Cs (particle-associated)	13	7148.4	0.0	2815.4	pCi/g
¹³⁷ Cs (total)	8	324.4	10.8	90.6	pCi/L
Total suspended solids	13	47.0	3.4	23.9	mg/L

3.3.5 Concrete Cap Installation

Concrete caps were installed in the sediment-retention structure on March 27 and April 5, 1992. Radiological data from composite samples collected during concrete cap construction do not indicate increased ¹³⁷Cs levels associated with these activities. No increases in pH or contaminant concentrations associated with concrete cap installation were observed at the WOC mouth (Appendix D). All water quality parameters were within seasonally expected normal values.

3.3.6 Rock Anchor Drilling

Drilling of rock anchors was conducted in the sediment-retention structure from April 4 through April 10, 1992. Cesium-137 activity in 24-h composite samples at the WOC mouth and K-1513 increased in conjunction with this phase of construction (Figs. 3a, 3b, 4a, and 4b; Table 7); activities were also elevated in grab samples collected at the WOC mouth. The maximum total ¹³⁷Cs level for 24-h composites at WOC was approximately 2400 pCi/L (Appendix A), with maximum particle-associated ¹³⁷Cs values of 4900 pCi/g (Appendix A). Composite sampler maximum values for K-1513 were 1 pCi/L total ¹³⁷Cs and 250 pCi/g for particle-associated ¹³⁷Cs samples (Appendix A). Grab samples collected directly from resuspended sediment plumes at the WOC mouth ranged from below background (1 pCi/L) to 2400 pCi/L total ¹³⁷Cs. Particle-associated ¹³⁷Cs values ranged from 400 to 6700 pCi/g (Appendix D).

3.3.7 Postconstruction Monitoring

Composite sample collection continued for 3½ months following the conclusion of construction. Values for total ¹³⁷Cs, total suspended solids, and turbidity dropped following final completion of the coffer-cell structure (Figs. 3a, 3b, 4a, and 4b; Appendix A). Collection of 24-h composite samples for assessment of particle-associated ¹³⁷Cs was discontinued shortly after construction was complete. Though detectable quantities of radionuclides were observed at both monitoring stations, these values were within the range of measured values in water

released from WOL over the same time period (Appendix B) and were comparable to values reported in previous years (Kornegay et al. 1990, 1991, and 1992).

Table 7. List of parameters, range, and number of observations for samples collected during rock anchor drilling activities associated with construction of the sediment retention structure at WOCK 0.0

(Data were collected from April 6 through April 10, 1992.)

Analyte	Number	Maximum	Minimum	Mean	Units
¹³⁷ Cs (particle-associated)	21	6735.2	407.4	3144.3	pCi/g
¹³⁷ Cs (total)	10	2378.6	-10.8	595.7	pCi/L
Total suspended solids	21	113.0	5.7	38.7	mg/L

4. DISCUSSION

Monitoring results for specific construction activities are discussed in the following sections. Specific construction project-driven objectives for monitoring appear in Sect. 3.3.

4.1 COMPOSITE SAMPLING

Composite sampler operations at or near the WOC mouth station were conducted from June 1991 through July 1992 (Table 1). During periods when no construction occurred, the sampler at this station did not function because of cold temperatures and low water levels (Table 3). Composite sampler operations at the K-1513 station (the K-25 Site water intake structure at CRM 14.5) began in September 1991 and continued through July 1992; samples from this station were obtained regardless of lake-level fluctuations. Composite sample pH values were collected from February through July 1992 and are discussed in Sect. 4.3.3. The frequency of sample collection from either the WOC or K-1513 stations depended upon the construction activity.

Turbidity and TSS concentrations at both stations varied greatly with seasonal changes in ambient suspended solids concentrations in the Clinch River (Figs. 3d, 3e, 4d, and 4e). During the early fall (September, October, and early November 1991), TSS values rarely rose above the detection limit of 5 mg/L, with turbidity values below 3 NTU. By late November, values had begun to rise; they varied between 6 and 50 mg/L. TSS peaked at over 250 mg/L (Table 3 and Appendix A) during early January, dropping gradually back to the 10- to 50-mg/L range in February and March. TSS dropped to or below the limits of detection by early May and remained low through the summer, except when summer storms briefly (episodically) drove suspended solids values up again. No increases attributable solely to construction activities were observed in 24-h composite samples. Neither did analytical results for sample pH, initiated in February for 24-h composite samples, indicate observable impacts to surface waters from construction activities.

Cesium-137 is a highly particle-reactive radionuclide with a particle-to-water distribution coefficient (K_D = concentration per kilogram of particles divided by concentration per liter of water) of approximately 10^5 (Olsen et al. 1992). The WOD and WOC mouth water samples show low but measurable concentrations of ^{137}Cs leaving WOC during normal flow conditions (Appendices B and D). These values for the WOC mouth dropped immediately following closure of the coffer-cell wall and stayed low during the early fall of 1991 regardless of construction activities (Figs. 3a and 3b). Cesium-137 levels at the WOC mouth rose with increasing late fall rainstorms, runoff, and increasing TSS levels, all due to normal seasonal changes in water conditions. Similar episodic patterns in discharge, water quality, and contaminant concentrations were observed at the WOD sampling station (Fig. 2 and Appendix B). Throughout December, January, and part of February, the ^{137}Cs values at the WOC mouth remained low, normally below detection. The peak total ^{137}Cs value for K-1513 was observed during December 1991 coincident with a high-volume discharge from WOD (Figs. 2 and 4a; Table 3; Appendix A). With this exception, data from the K-1513 station from September 1991 through February 1992 showed little or no detectable ^{137}Cs contamination at the K-25 Site water intake despite high particle loads in the Clinch River (Fig. 4). This implies that (1) a majority of the suspended-particle load in the Clinch River comes from

sources not contaminated with ^{137}Cs upstream in the Clinch River watershed, and (2) for most time periods, WOC discharge to the Clinch River is diluted sufficiently so as to be undetectable in surface water samples 10 km downstream.

Radiological data from 24-h composite samples collected from the WOC station during jet grouting and concrete cap construction indicate that there were no increases in ^{137}Cs levels associated with these activities over levels measured upstream from WOD (Table 5; Fig. 4; Appendix A). Cesium-137 results at the K-1513 station were below the quantitation limit. However, there were marked increases in 24-h composite radiological results coincident with sediment dredging and rock anchor drilling (Figs. 3a, 3b, 4a, and 4b; Appendix D). At the WOC station, maximum values during dredging activities were 170 pCi/L and 2900 pCi/g for total and particle-associated ^{137}Cs , respectively, greatly elevated relative to all previous 24-h composite sample observations at the WOC mouth. The values for K-1513 were also elevated for the time frame, though they were lower than observed at the WOC mouth; K-1513 maximum values were 10 pCi/L and 1400 pCi/g total ^{137}Cs and particle-associated ^{137}Cs respectively. These elevated 24-h composite results may be a function of low discharge rates from White Oak and Melton Hill dams, resulting in low dilution ratios for contaminants. Flow volumes were maintained at a low level during dredge operations to reduce sediment scouring (Fig. 2). This elevation in ^{137}Cs illustrates the importance of minimizing to the extent practical the disturbance of these sediments.

Levels of particle-associated radiological contaminants in water dropped to below detection limits at both the K-1513 and WOC mouth stations following completion of the sediment-retention structure. Values were comparable with those observed during nonconstruction monitoring, following the establishment of surface sediment control in September 1991 (Figs. 3a, 3b, 4a, and 4b). There were still episodes of ^{137}Cs release to the Clinch River, though these may be related to sediment resuspension and transport from WOL through WOCE and into the Clinch River during elevated discharge (Fig. 2 and Appendix B).

QA/QC data collected in conjunction with 24-h composite samples indicate that the analytical standard errors for total suspended particles, turbidity, and pH results were 10% or less.

4.2 CONTINUOUS WATER QUALITY MONITORING

Routine water quality monitoring results at the WOC station indicated normal seasonal shifts in temperature, pH, dissolved oxygen, and conductivity during the course of this monitoring project (Fig. 5; Table 4; Appendix C). Monitoring of pH during jet grout and concrete cap construction is discussed in Sects. 4.3.3 and 4.3.4. Stage height data collected throughout this project illustrate the impact of routine reservoir operations on water elevations at the WOC mouth (Fig. 5e). As noted in Sect. 2.1.2, continuous nephelometric monitoring at the site was discontinued prior to construction.

4.3 EVENT-SPECIFIC MONITORING

Results from each phase of the construction project requiring on-site, real-time sample and data collection are discussed here. The objectives for real-time monitoring (Sect. 1.3) focused on construction-related contaminant releases and determined the data and sample collection for each construction event. All event-specific monitoring data are found in Appendix D.

4.3.1 Sheet Pile Installation

Pile-driving activities conducted in August 1991 and the resulting restriction of the WOC channel increased the potential for scouring of contaminated sediments out of the streambed. These activities were monitored by close-interval sampling from a boat in the embayment mouth as well as through composite sampler monitoring (Communication 081591A.SOW in Ford 1993a). Increases in contamination at either the WOCE or the K-1513 stations would be indicative of sediment scour. Water releases from White Oak and Melton Hill dams were regulated to minimize flows during the final stages of this installation process.

No increases in contaminant resuspension and transport into the Clinch River associated with pile-driving operations were observed for any monitored parameters (Appendix D). None of the monitored water quality variables were affected by the construction activity. Water flow restriction from both dams had no observable impact upon contaminant concentrations.

4.3.2 Rock Armoring

Placement of rock to armor the shoreline was performed from mid-September through early October 1991. Erosion prevention by rock armoring involves the placement of large rocks on the sediment surface using a clamshell dredge. This activity had a great potential to disturb and release contaminated sediments (Communication WOCE\091791A.SOW in Ford 1993a). These activities were completed prior to grout reinforcement and rock anchor drilling, out of the original construction sequence due to construction delays (Table 2; Kimmel and Ford 1991). Resuspension events resulting from the displacement of potentially contaminated sediments by armoring were monitored by close-interval sampling from a boat as well as through composite sampler monitoring. Samples collected from the plume were analyzed for particle-associated and total ^{137}Cs , TSS, and turbidity.

Rock armoring of the shoreline resulted in generation of small-scale observable plumes of sediment in lower WOCE and the Clinch River; however, these plumes dissipated quickly and did not result in changes in any monitored parameter at either monitoring station (Appendix D).

4.3.3 Jet Grouting

The injection of grout/water mixtures to reinforce the foundation of the sediment-retention structure at the sediment/bedrock interface (jet grouting) was performed during February and March 1992 (Communication WOCE\030992A.SOW in Ford 1993a). Concentrated grout mixtures such as are used for jet grouting have a pH of approximately 12, which places them in the range of RCRA corrosive materials. Monitoring activities during jet

grouting focused upon potential sediment disturbance and the possible release of high-pH grout directly to surface waters in violation of Tennessee state water quality standards (Communications WOCE\030692A.SAP and WOCE\030992A.SOW in Ford 1993a). Release of grout-contaminated materials was indicated by an observed suspended solids plume accompanied by increased surface water pH. Continuous monitoring of in-stream pH occurred whenever jet grout activity was in progress. Samples were analyzed for particle-associated and total ^{137}Cs , TSS, turbidity, and pH (Table 5 and Appendix D). Cesium-137 activity in grab samples at the WOC station, comparable with that from WOD (Appendix B), was observed in association with jet grouting at the WOC mouth.

High-pH grout releases during the jet grouting activity were not evident from routine analytical requests for 24-h composite samples, which yielded maximum values below pH 9 (Fig. 3c). However, monitoring data from the continuous recording device at the site (Figs. 5b and 6) closely tracked pH increases related to the release of grout. A single construction-related release resulted in a pH peak of approximately 10.6 for surface waters (Fig. 6). The impact to surface water pH from this event dissipated within 4 h. Additional high-pH grout releases resulted in momentary increases to over pH 9.7, though such releases were rare and short-lived. Occurrence reports detailing the impact of construction activities on surface waters were filed when in-stream pH values rose above 10 for any length of time.

4.3.4 Dredging

Surface sediment relocation within the coffer cell was performed in order to provide adequate space for concrete cap installation following jet grout completion (Communication WOCE\032592A.SOW in Ford 1993a). A small amount of surface sediment relocation was necessitated by sediment upheaval resulting from jet grout operations. Sediment relocation was accomplished with a clamshell dredge. Monitoring activities focused upon sediment disturbance and transport downstream due to dredge operations. Water discharge from both White Oak (Fig. 2) and Melton Hill dams was minimized during the sediment relocation process.

Between a few centimeters and 0.5 m of surface sediment, with an estimated volume of 2.1 m^3 , was relocated. This activity resulted in resuspension and transport of contaminated sediment out of the coffer cell. Release of ^{137}Cs -contaminated sediments by this small relocation was evident in both the 24-h composite and on-site grab samples collected in conjunction with dredging (Figs. 3a and 3b; Table 6). At the WOC station, grab samples from real-time monitoring yielded values from 800 to 7150 pCi of ^{137}Cs per gram of suspended solids, values comparable with surface sediments in the vicinity of the dredging activity (Blaylock et al. 1993). Twenty-four-hour composite values for particle-associated ^{137}Cs were also greatly elevated, with maximum particle-associated ^{137}Cs of 2900 pCi/g. Values for 24-h composite sample collection at K-1513 were also high for the time frame, though they were lower than those upstream (range 1 to 10 pCi/L for total ^{137}Cs activity; maximum particle-associated ^{137}Cs was 1400 pCi/g).

Though construction was designed to avoid such overt sediment disturbance, relocation became necessary to ensure the structural integrity of the coffer cell. These data reinforce the importance of minimal sediment disturbance during construction, suggesting that large quantities of particle-associated ^{137}Cs would have been released if conventional excavation construction techniques had been used.

4.3.5 Concrete Cap Installation

Monitoring for concrete cap installation followed the same scheme as monitoring for jet grouting. No sediment disturbance was anticipated or observed with the concrete cap installation. Installation was performed in two stages to allow proper curing of the concrete prior to inundation; the side cells were poured on March 26, 1992, and the center cell was poured on April 5, 1992. Water discharge from White Oak (Fig. 2) and Melton Hill dams was minimized during this installation process.

Site sample collection was tied to the observation of elevated pH values or turbidity plumes; composite samples were collected in conjunction with the March 26 work only. No increases in pH or in cement-related plumes were observed in conjunction with cap installation. Unlike jet grouting, there were no increases in ^{137}Cs associated with concrete cap installation (Appendix D).

4.3.6 Rock Drilling

Rock anchor drilling and installation was the last construction activity monitored for sediment disturbance. Rock anchor construction involved use of a drill rig over preformed holes in the concrete cap to drill through the sediment and 20 ft into bedrock to install the rock anchors. Release of contaminated sediment during rock anchor drilling had not been considered as a possibility in initial monitoring plans (Kimmel and Ford 1991). The bedrock encountered was fractured, necessitating the high-pressure injection of a fluid through the drill rod to keep the drill bit from becoming fouled; attempts to keep the drill clean and to complete the rock anchor holes with cleaning fluids other than air failed. The possibilities for turbulence and sediment disturbance were not recognized until late in the project when the drilling of a test hole resulted in significant resuspension of surface sediments within the coffer cell. Because of previous delays in the project, there was not time to consider other rock anchor drilling alternatives. Air was injected through the drill stem under high pressure, exiting through the drill bit. After leaving the cutting head, the pressurized air forced its way back to the surface. These high-pressure streams of air effectively resuspended surface sediments outside of the coffer-cell structures both upstream in WOCE and downstream at the WOC mouth.

As reported in Sect. 3.3.6, ^{137}Cs activities in 24-h composite samples from both monitoring stations increased during rock anchor drilling (Figs. 3a, 3b, 4a, and 4b; Table 7). Cesium-137 activities were also elevated for water grab samples collected at the WOC mouth. The maximum ^{137}Cs values for both composite and grab samples are presented in Sect. 3.3.6. Sediment disturbance resulted from streams of air that followed fractures in the bedrock to reach the surface sediment. As with the sediment relocation activity (Sect. 4.3.4), ^{137}Cs levels in water samples were similar to those observed on WOCE surface sediments throughout the embayment (Blaylock et al. 1993). Contaminant levels in 24-h composites for K-1513 were also elevated, with the maximum particle-associated ^{137}Cs value observed during rock anchor drilling (Table 3).

4.3.7 Postconstruction Monitoring

Short-term monitoring conducted after completion of the sediment-retention structure indicates a decrease in ^{137}Cs in the Clinch River over previous years, given similar input to

WOCE from WOD. This suggests that the structure has effectively created a zone of quiescent water, allowing particle-associated contaminants to settle out of the water column.

Values for total ^{137}Cs , TSS, and turbidity dropped following final completion of the sediment-retention structure (Figs. 3a, 3b, 4a, and 4b; Appendix A). Though detectable quantities of radionuclides were observed at both monitoring stations, these values were within the ranges of those released from WOD over the same time period (Appendix B) and comparable with those reported previously (Kornegay et al. 1992).

5. CONCLUSIONS

Construction of the coffer-cell structure at the WOC mouth was performed with a minimal amount of sediment disturbance as compared with conventional excavation techniques. However, the high-pressure injection of air to prevent the rock anchor drill bit from fouling resulted in the disturbance, resuspension, and transport of contaminated sediment into the Clinch River and downstream. This impact dissipated when rock anchor drilling was completed.

Short-term postconstruction monitoring indicates a decrease in ^{137}Cs in the Clinch River compared with previous years, given similar input to WOCE from WOL. This suggests that the structure has effectively created a zone of quiescent water, allowing particle-associated contaminants to settle out of the water column.

Complete evaluation of the effectiveness of this structure will require more thorough investigation, particularly regarding the impact of high-flow storm events on particle resuspension and transport within and through the embayment. These longer term studies will be carried out by the WAG 2 ER Project, in coordination with the Clinch River ER Program.

6. SUMMARY

Water quality monitoring activities, focused on the detection of resuspended sediments in the Clinch River, were conducted in conjunction with the WOCE time-critical CERCLA removal action to construct a sediment-retention coffer-cell structure at the mouth of WOC. Samples were collected by use of both a 24-h composite sampler and real-time water grab sampling of sediment plumes generated by the construction activities.

Surface water radiological data collected prior to coffer-cell closure were used to gauge the effectiveness of the coffer-cell structure at the WOC mouth. These data showed low but measurable quantities of ^{137}Cs leaving the embayment under normal flow conditions.

Preconstruction ^{137}Cs values dropped immediately following closure of the coffer-cell wall and stayed low during the early fall of 1991 regardless of construction activities. No increase in contaminant resuspension and transport into the Clinch River was observed in association with sheet pile driving or rock armoring operations. However, during periods of no construction activity, there were seasonal increases in ^{137}Cs concentrations at the WOC mouth.

Levels of ^{137}Cs at both stations rose with increasing late fall rainstorms, runoff, and increasing TSS levels as a function of seasonal changes in the WOC watershed. Values remained below the counting error in the absence of concentrations of high suspended solids associated with storms throughout October, November, December, January, and February. Data from the K-1513 station over the same time period showed little or no detectable ^{137}Cs contamination at the K-25 Site water intake.

Increases in ^{137}Cs activity associated with jet grouting were observed at the WOC mouth, though these impacts did not extend downstream to the K-1513 station. Review of radiological data from composite samples collected during concrete cap construction does not indicate increased ^{137}Cs levels associated with these activities.

Cesium-137 activity for both 24-h composite samples (WOC and K-1513) and surface water grab samples increased in conjunction with sediment dredging and rock anchor drilling. At the WOC station, ^{137}Cs values for dredging at WOC were elevated by one to two orders of magnitude relative to nonconstruction reference levels observed from October through February. Values for K-1513 were also elevated for the time frame, though they were one to two orders of magnitude lower than those upstream.

Levels of particle-associated ^{137}Cs at both monitoring stations dropped below detection limits following completion of the sediment-retention structure. Following the establishment of surface sediment control, values were comparable with those observed during nonconstruction monitoring. Release of ^{137}Cs to the Clinch River from WOD through WOCE appears to be related to sediment resuspension and transport from WOL during high-flow events.

7. REFERENCES

Blaylock, B. G., C. J. Ford, M. L. Frank, F. O. Hoffman, and L. A. Hook. 1993. *White Oak Creek Embayment Site Characterization and Contaminant Screening Analysis*, ORNL/ER-81. Martin Marietta Energy Systems, Inc., Oak Ridge, Tennessee.

EPA (U.S. Environmental Protection Agency). 1979. *Methods for the Chemical Analysis of Water and Wastes*, EPA-600/4-79-020. EPA, Washington, D.C.

EPA (U.S. Environmental Protection Agency). 1980. *Prescribed Procedures for Measurement of Radioactivity in Drinking Water*, EPA-600/4-80-032. H. L. Krieger, Environmental Monitoring and Support Laboratory, and E. A. Whittaker, Environmental Monitoring Systems Laboratory.

Energy Systems (Martin Marietta Energy Systems, Inc.). 1990. *Clinch River RCRA Facility Investigation Plan*, ES/ER-1/D1. Martin Marietta Energy Systems Environmental Restoration Program, Oak Ridge, Tennessee.

Ford, C. J. 1993a. *Compilation of Statements of Work for the WOCM Project*. Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Communication WOCE/070891A.SOW. "Statement of Work for Analytical Services to be Provided by ORNL-ACD to ORNL-ESD in Support of the White Oak Creek Monitoring Project." C. J. Ford, Off-Site Environmental Restoration Program, Martin Marietta Energy Systems, Inc., Oak Ridge, Tennessee, 1991.

Communication WOCE/070891B.SOW. "Statement of Work for Sample Collection and Processing Services To Be Provided by ORNL-OEHP-ESP to ORNL-ESD in Support of the White Oak Creek Monitoring Project." C. J. Ford, Off-Site Environmental Restoration Program, Martin Marietta Energy Systems, Inc., Oak Ridge, Tennessee, 1991.

Communication WOCE/081591A.SOW. "Statement of Work for Collection of Surface Water Quality Data and Samples in Conjunction with the Construction of a Cofferdam Structure at the Mouth of White Oak Creek Embayment, August 19, 20, 21 1991. C. J. Ford, Off-Site Environmental Restoration Program, Environmental Sciences Division, Oak Ridge National Laboratory, Martin Marietta Energy Systems, Inc., Oak Ridge, Tennessee, 1991.

Communication WOCE/091791A.SOW. "Statement of Work for Collection of Surface Water Quality Data and Samples in Conjunction with Shoreline Rock Armoring Activities at and Immediately Downstream from the Mouth of White Oak Creek Embayment, Beginning September 18, 1991." C. J. Ford, Off-Site Environmental Restoration Program, Environmental Sciences Division, Oak Ridge National Laboratory, Martin Marietta Energy Systems, Inc., Oak Ridge, Tennessee, 1991.

Communication WOCE\030692A.SAP. "Plan for the Collection and Analysis of Samples from Jet Grout Rinse Waste Waters at White Oak Creek Embayment." C. J. Ford, Clinch River Environmental Restoration Program, Environmental Sciences Division, Oak Ridge National Laboratory, Martin Marietta Energy Systems, Inc., Oak Ridge, Tennessee, 1992.

Communication WOCE\030992A.SOW. "Statement of Work for Collection of Surface Water Quality Data and Samples in Conjunction with Jet Grout Armoring Activities in the White Oak Creek Embayment, March 1992." C. J. Ford, Clinch River Environmental Restoration Program, Environmental Sciences Division, Oak Ridge National Laboratory, Martin Marietta Energy Systems, Inc., Oak Ridge, Tennessee, 1992.

Communication WOCE\032592A.SOW. "Statement of Work for Collection of Surface Water Quality Data and Samples in Conjunction with Dredging of Cofferdam Cell Surface Sediments in the White Oak Creek Embayment, March 1992." C. J. Ford, Clinch River Environmental Restoration Program, Environmental Sciences Division, Oak Ridge National Laboratory, Martin Marietta Energy Systems, Inc., Oak Ridge, Tennessee, 1992.

Ford, C. J. 1993b. *Compilation of Sample Identification Numbers for the WOCM Project*. Martin Marietta Energy Systems, Inc., Oak Ridge, Tennessee.

Kimbrough, C. W., L. W. Long, and L. W. McMahon (eds.). 1990. *Environmental Surveillance Procedures Quality Control Program*, ESH/Sub/87-21706/1. Martin Marietta Energy Systems, Inc., Oak Ridge, Tennessee.

Kimmel, B. L., and C. J. Ford. 1991. *White Oak Creek Embayment, Time-Critical CERCLA Removal Action Water Quality Monitoring Plan*. Off-Site Environmental Restoration Program, Martin Marietta Energy Systems, Inc., Oak Ridge, Tennessee.

Kornegay, F. C., D. C. West, S. T. Goodpasture, C. W. Kimbrough, M. F. Tardiff, V. A. Jacobs, and A. R. Wilson. 1990. *Oak Ridge Reservation Environmental Report for 1989*, ES/ESH-13. Martin Marietta Energy Systems, Inc., Oak Ridge, Tennessee.

Kornegay, F. C., D. C. West, R. A. Evans, S. T. Goodpasture, M. F. Tardiff, and A. R. Wilson. 1991. *Oak Ridge Reservation Environmental Report for 1990*, ES/ESH-18. Martin Marietta Energy Systems, Inc., Oak Ridge, Tennessee.

Kornegay, F. C., D. C. West, R. A. Evans, M. F. Tardiff, F. D. Adams, and P. C. Mucke. 1992. *Oak Ridge Reservation Environmental Report for 1991*, ES/ESH-22. Martin Marietta Energy Systems, Inc., Oak Ridge, Tennessee.

Leslie, M., and B. J. Kimmel. 1992. *White Oak Creek Embayment Time-Critical CERCLA Removal Action Regulatory Compliance Study*, ORNL/ER/Sub/91-KA931/3. Martin Marietta Energy Systems, Inc., Oak Ridge, Tennessee

Olsen, C. R., I. L. Larsen, P. D. Lowry, C. R. Moriones, C. J. Ford, K. C. Dearstone, R. R. Turner, B. L. Kimmel, and C. C. Brandt. 1992. *Transport and Accumulation of Cesium-137 and Mercury in the Clinch River and Watts Bar Reservoir System*, ORNL/ER-7. Martin Marietta Energy Systems, Inc., Oak Ridge, Tennessee.

Appendix A

PHYSICAL-CHEMICAL MEASUREMENTS AND CONTAMINANT ANALYTICAL RESULTS FOR 24-h COMPOSITE SAMPLES FROM THE K-1513 AND WHITE OAK CREEK STATIONS

Table A.1. Total ^{137}Cs results from 24-h composite samples

Date	River mile	Result	Rad. error	Units
18 Sep 91	20.8	-1.89	17.03	pCi/L
19 Sep 91	14.5	-0.54	12.70	pCi/L
19 Sep 91	20.8	1.08	12.70	pCi/L
20 Sep 91	20.8	4.32	12.70	pCi/L
23 Sep 91	20.8	2.16	14.60	pCi/L
24 Sep 91	14.5	3.78	4.32	pCi/L
24 Sep 91	20.8	-0.54	11.89	pCi/L
25 Sep 91	14.5	-0.54	10.00	pCi/L
25 Sep 91	20.8	5.14	9.73	pCi/L
26 Sep 91	14.5	-1.08	11.08	pCi/L
26 Sep 91	20.8	10.00	7.03	pCi/L
27 Sep 91	14.5	-2.70	14.87	pCi/L
27 Sep 91	20.8	12.70	14.06	pCi/L
30 Sep 91	14.5	-3.51	15.95	pCi/L
30 Sep 91	20.8	-2.16	17.57	pCi/L
01 Oct 91	14.5	-1.08	13.24	pCi/L
01 Oct 91	20.8	2.16	10.81	pCi/L
02 Oct 91	14.5	-2.16	9.73	pCi/L
02 Oct 91	20.8	1.08	14.60	pCi/L
03 Oct 91	14.5	1.08	9.73	pCi/L
03 Oct 91	20.8	1.89	11.89	pCi/L
04 Oct 91	14.5	-1.08	8.11	pCi/L
04 Oct 91	20.8	1.35	11.89	pCi/L
07 Oct 91	14.5	5.14	4.05	pCi/L
07 Oct 91	20.8	0.54	6.22	pCi/L
29 Oct 91	14.5	1.62	7.84	pCi/L
29 Oct 91	20.8	1.89	14.06	pCi/L
30 Oct 91	20.8	11.62	8.92	pCi/L
31 Oct 91	14.5	-1.62	10.00	pCi/L
31 Oct 91	20.8	-1.62	10.00	pCi/L
01 Nov 91	20.8	0.54	10.81	pCi/L

Table A.1 (continued)

Date	River mile	Result	Rad. error	Units
04 Nov 91	20.8	-3.51	12.70	pCi/L
05 Nov 91	14.5	-4.32	11.89	pCi/L
05 Nov 91	20.8	3.51	17.30	pCi/L
06 Nov 91	14.5	12.97	8.92	pCi/L
06 Nov 91	20.8	11.89	11.89	pCi/L
06 Nov 91	20.8	2.70	11.89	pCi/L
07 Nov 91	20.8	-3.51	18.38	pCi/L
11 Nov 91	20.8	-1.62	13.79	pCi/L
15 Nov 91	20.8	6.49	6.22	pCi/L
18 Nov 91	20.8	-0.81	13.79	pCi/L
19 Nov 91	14.5	-0.81	15.41	pCi/L
19 Nov 91	20.8	-0.54	8.92	pCi/L
20 Nov 91	20.8	1.62	11.89	pCi/L
21 Nov 91	14.5	0.81	8.38	pCi/L
22 Nov 91	20.8	40.55	10.81	pCi/L
25 Nov 91	20.8	0.81	13.79	pCi/L
26 Nov 91	14.5	1.35	16.22	pCi/L
02 Dec 91	14.5	1.89	17.30	pCi/L
02 Dec 91	20.8	54.06	10.81	pCi/L
03 Dec 91	14.5	-7.30	15.41	pCi/L
03 Dec 91	20.8	62.17	13.52	pCi/L
04 Dec 91	14.5	-3.78	14.87	pCi/L
04 Dec 91	20.8	9.73	19.19	pCi/L
05 Dec 91	14.5	13.79	18.92	pCi/L
05 Dec 91	20.8	-6.76	19.19	pCi/L
06 Dec 91	14.5	0.54	8.92	pCi/L
06 Dec 91	20.8	2.97	15.14	pCi/L
09 Dec 91	14.5	4.60	10.54	pCi/L
10 Dec 91	14.5	2.70	16.22	pCi/L
12 Dec 91	14.5	2.70	20.00	pCi/L
13 Dec 91	14.5	7.57	19.19	pCi/L

Table A.1 (continued)

Date	River mile	Result	Rad. error	Units
16 Dec 91	14.5	2.16	8.92	pCi/L
17 Dec 91	14.5	-4.05	13.24	pCi/L
17 Dec 91	20.8	5.14	10.27	pCi/L
18 Dec 91	14.5	2.16	10.00	pCi/L
19 Dec 91	14.5	-0.54	8.92	pCi/L
20 Dec 91	14.5	6.76	7.84	pCi/L
26 Dec 91	14.5	-2.43	18.38	pCi/L
26 Dec 91	20.8	3.24	4.32	pCi/L
30 Dec 91	14.5	4.87	12.43	pCi/L
30 Dec 91	20.8	1.08	15.14	pCi/L
31 Dec 91	14.5	4.87	7.84	pCi/L
02 Jan 92	14.5	1.08	7.84	pCi/L
03 Jan 92	14.5	-5.95	14.06	pCi/L
06 Jan 92	14.5	0.81	14.87	pCi/L
06 Jan 92	20.8	10.27	16.49	pCi/L
07 Jan 92	14.5	6.76	9.73	pCi/L
09 Jan 92	14.5	2.43	10.81	pCi/L
13 Jan 92	14.5	10.54	9.19	pCi/L
14 Jan 92	14.5	-0.81	12.16	pCi/L
15 Jan 92	14.5	-2.43	25.14	pCi/L
16 Jan 92	14.5	3.51	12.43	pCi/L
17 Jan 92	14.5	-1.89	14.06	pCi/L
20 Jan 92	14.5	3.78	10.00	pCi/L
21 Jan 92	14.5	-4.32	12.70	pCi/L
22 Jan 92	14.5	-8.92	19.73	pCi/L
23 Jan 92	14.5	5.95	10.54	pCi/L
24 Jan 92	14.5	2.16	6.22	pCi/L
27 Jan 92	14.5	5.95	4.32	pCi/L
28 Jan 92	14.5	1.62	8.65	pCi/L
29 Jan 92	14.5	-2.70	11.89	pCi/L
30 Jan 92	14.5	-10.81	22.43	pCi/L

Table A.1 (continued)

Date	River mile	Result	Rad. error	Units
05 Feb 92	14.5	5.14	7.03	pCi/L
05 Feb 92	14.5	-1.62	12.97	pCi/L
05 Feb 92	20.8	-0.81	15.68	pCi/L
06 Feb 92	14.5	6.49	11.08	pCi/L
06 Feb 92	20.8	-1.35	14.60	pCi/L
07 Feb 92	14.5	2.70	7.84	pCi/L
07 Feb 92	20.8	-11.08	22.98	pCi/L
11 Feb 92	14.5	4.87	8.92	pCi/L
12 Feb 92	14.5	-1.62	10.00	pCi/L
12 Feb 92	20.8	19.19	13.24	pCi/L
13 Feb 92	14.5	-0.54	12.97	pCi/L
14 Feb 92	14.5	-2.16	21.62	pCi/L
18 Feb 92	14.5	-0.27	26.22	pCi/L
18 Feb 92	20.8	14.87	8.65	pCi/L
19 Feb 92	14.5	3.78	8.92	pCi/L
19 Feb 92	20.8	21.08	11.35	pCi/L
21 Feb 92	14.5	0.81	15.14	pCi/L
21 Feb 92	20.8	29.73	13.52	pCi/L
25 Feb 92	14.5	-3.24	12.70	pCi/L
25 Feb 92	20.8	35.14	10.81	pCi/L
26 Feb 92	20.8	37.84	13.52	pCi/L
27 Feb 92	14.5	-2.43	15.41	pCi/L
27 Feb 92	20.8	54.06	13.52	pCi/L
28 Feb 92	14.5	7.84	11.89	pCi/L
03 Mar 92	14.5	1.35	13.24	pCi/L
03 Mar 92	20.8	37.84	10.81	pCi/L
05 Mar 92	14.5	-7.57	19.46	pCi/L
05 Mar 92	20.8	29.73	10.81	pCi/L
06 Mar 92	14.5	2.16	13.24	pCi/L
06 Mar 92	20.8	19.73	13.24	pCi/L
10 Mar 92	14.5	7.30	7.57	pCi/L

Table A.1 (continued)

Date	River mile	Result	Rad. error	Units
10 Mar 92	20.8	32.44	16.22	pCi/L
11 Mar 92	14.5	1.08	6.22	pCi/L
12 Mar 92	14.5	0.27	6.76	pCi/L
13 Mar 92	14.5	4.32	15.14	pCi/L
17 Mar 92	14.5	-0.54	9.73	pCi/L
18 Mar 92	14.5	2.16	13.24	pCi/L
18 Mar 92	20.8	29.73	13.52	pCi/L
19 Mar 92	14.5	-5.41	29.73	pCi/L
19 Mar 92	20.8	51.36	16.22	pCi/L
20 Mar 92	14.5	3.24	12.97	pCi/L
20 Mar 92	20.8	59.47	13.52	pCi/L
24 Mar 92	14.5	-1.62	14.06	pCi/L
24 Mar 92	20.8	37.84	13.52	pCi/L
25 Mar 92	14.5	0.54	8.11	pCi/L
25 Mar 92	20.8	22.16	9.73	pCi/L
26 Mar 92	14.5	3.51	7.03	pCi/L
26 Mar 92	20.8	64.87	24.33	pCi/L
27 Mar 92	14.5	10.81	10.00	pCi/L
27 Mar 92	20.8	170.29	29.73	pCi/L
31 Mar 92	14.5	1.89	14.06	pCi/L
31 Mar 92	20.8	19.46	11.89	pCi/L
01 Apr 92	14.5	6.22	14.06	pCi/L
01 Apr 92	20.8	2.16	10.81	pCi/L
02 Apr 92	14.5	7.84	11.35	pCi/L
02 Apr 92	20.8	62.17	13.52	pCi/L
03 Apr 92	14.5	7.57	8.92	pCi/L
03 Apr 92	20.8	7.84	6.49	pCi/L
07 Apr 92	14.5	-6.22	18.11	pCi/L
07 Apr 92	14.5	-6.22	18.11	pCi/L
07 Apr 92	20.8	25.41	14.60	pCi/L
07 Apr 92	20.8	25.41	14.60	pCi/L

Table A.1 (continued)

Date	River mile	Result	Rad. error	Units
08 Apr 92	14.5	7.03	14.06	pCi/L
08 Apr 92	20.8	37.84	10.81	pCi/L
09 Apr 92	14.5	-1.62	15.41	pCi/L
09 Apr 92	20.8	35.14	13.52	pCi/L
10 Apr 92	14.5	5.95	18.11	pCi/L
14 Apr 92	14.5	5.14	16.22	pCi/L
15 Apr 92	14.5	5.95	5.41	pCi/L
15 Apr 92	20.8	59.47	16.22	pCi/L
16 Apr 92	14.5	-1.35	9.19	pCi/L
16 Apr 92	20.8	37.84	16.22	pCi/L
22 Apr 92	14.5	-0.54	16.76	pCi/L
22 Apr 92	20.8	4.87	6.76	pCi/L
29 Apr 92	14.5	2.43	7.03	pCi/L
29 Apr 92	20.8	0.54	12.97	pCi/L
06 May 92	14.5	2.97	7.03	pCi/L
06 May 92	20.8	-1.35	13.79	pCi/L
13 May 92	14.5	4.87	16.22	pCi/L
13 May 92	20.8	7.57	11.89	pCi/L
20 May 92	14.5	1.89	18.11	pCi/L
20 May 92	20.8	2.43	8.11	pCi/L
27 May 92	14.5	-0.81	17.30	pCi/L
27 May 92	20.8	4.87	14.06	pCi/L
04 Jun 92	14.5	-3.24	11.62	pCi/L
04 Jun 92	20.8	6.49	9.73	pCi/L
10 Jun 92	14.5	-0.27	3.24	pCi/L
10 Jun 92	20.8	0.54	4.05	pCi/L
17 Jun 92	14.5	7.30	14.33	pCi/L
17 Jun 92	20.8	18.65	13.24	pCi/L
24 Jun 92	14.5	1.62	12.16	pCi/L
24 Jun 92	20.8	-1.89	24.60	pCi/L
30 Jun 92	14.5	-5.95	18.38	pCi/L

Table A.1 (continued)

Date	River mile	Result	Rad. error	Units
30 Jun 92	20.8	1.35	7.03	pCi/L
08 Jul 92	14.5	7.84	3.51	pCi/L
08 Jul 92	20.8	26.22	7.57	pCi/L
15 Jul 92	14.5	1.35	9.19	pCi/L
15 Jul 92	20.8	25.14	13.79	pCi/L
23 Jul 92	14.5	10.812	8.92	pCi/L
23 Jul 92	20.8	0.27	15.14	pCi/L
29 Jul 92	20.8	5.14	8.92	pCi/L

Table A.2. Water chemistry results from 24-h composite samples

Date	River mile	Analyte	Result	Units
18 Sep 91	20.8	Turbidity	1.5	NTU
18 Sep 91	20.8	Tot. susp. solids	5.0	mg/L
19 Sep 91	14.5	Turbidity	1.7	NTU
19 Sep 91	14.5	Tot. susp. solids	11.0	mg/L
19 Sep 91	20	Turbidity	1.1	NTU
20 Sep 91	20.8	Turbidity	1.9	NTU
20 Sep 91	20.8	Tot. susp. solids	5.0	mg/L
23 Sep 91	20.8	Turbidity	1.2	NTU
23 Sep 91	20.8	Tot. susp. solids	5.0	mg/L
24 Sep 91	14.5	Tot. susp. solids	5.0	mg/L
24 Sep 91	14.5	Turbidity	1.8	NTU
24 Sep 91	20.8	Tot. susp. solids	5.0	mg/L
24 Sep 91	20.8	Turbidity	1.8	NTU
25 Sep 91	14.5	Turbidity	1.4	NTU
25 Sep 91	14.5	Tot. susp. solids	5.0	mg/L
25 Sep 91	20.8	Tot. susp. solids	5.0	mg/L
25 Sep 91	20.8	Turbidity	2.2	NTU
26 Sep 91	14.5	Tot. susp. solids	5.0	mg/L
26 Sep 91	14.5	Turbidity	1.5	NTU
26 Sep 91	20.8	Turbidity	2.3	NTU
26 Sep 91	20.8	Tot. susp. solids	5.0	mg/L
27 Sep 91	14.5	Turbidity	1.9	NTU
27 Sep 91	14.5	Tot. susp. solids	5.0	mg/L
27 Sep 91	20.8	Tot. susp. solids	5.0	mg/L
27 Sep 91	20.8	Turbidity	2.4	NTU
30 Sep 91	14.5	Turbidity	1.1	NTU
30 Sep 91	14.5	Tot. susp. solids	5.0	mg/L
30 Sep 91	20.8	Turbidity	1.5	NTU
30 Sep 91	20.8	Tot. susp. solids	5.0	mg/L
01 Oct 91	14.5	Tot. susp. solids	5.0	mg/L
01 Oct 91	14.5	Turbidity	1.5	NTU

Table A.2 (continued)

Date	River mile	Analyte	Result	Units
01 Oct 91	20.8	Turbidity	1.5	NTU
01 Oct 91	20.8	Tot. susp. solids	5.0	mg/L
03 Oct 91	14.5	Turbidity	1.1	NTU
03 Oct 91	14.5	Tot. susp. solids	5.0	mg/L
03 Oct 91	20.8	Turbidity	1.1	NTU
03 Oct 91	20.8	Tot. susp. solids	5.0	mg/L
04 Oct 91	14.5	Tot. susp. solids	5.0	mg/L
04 Oct 91	14.5	Turbidity	2.4	NTU
04 Oct 91	20.8	Turbidity	1.7	NTU
04 Oct 91	20.8	Tot. susp. solids	5.0	mg/L
07 Oct 91	14.5	Turbidity	0.8	NTU
07 Oct 91	14.5	Tot. susp. solids	5.0	mg/L
07 Oct 91	20.8	Turbidity	1.0	NTU
07 Oct 91	20.8	Tot. susp. solids	5.0	mg/L
08 Oct 91	14.5	Tot. susp. solids	5.0	mg/L
08 Oct 91	14.5	Turbidity	1.7	NTU
29 Oct 91	14.5	Tot. susp. solids	5.0	mg/L
29 Oct 91	14.5	Turbidity	1.0	NTU
29 Oct 91	20.8	Tot. susp. solids	2.0	mg/L
29 Oct 91	20.8	Turbidity	0.8	NTU
30 Oct 91	20.8	Tot. susp. solids	6.0	mg/L
30 Oct 91	20.8	Turbidity	2.7	NTU
31 Oct 91	14.5	Tot. susp. solids	5.0	mg/L
31 Oct 91	14.5	Turbidity	1.5	NTU
31 Oct 91	20.8	Tot. susp. solids	5.0	mg/L
31 Oct 91	20.8	Turbidity	1.1	NTU
01 Nov 91	20.8	Turbidity	1.2	NTU
01 Nov 91	20.8	Tot. susp. solids	5.0	mg/L
04 Nov 91	20.8	Turbidity	1.1	NTU
04 Nov 91	20.8	Tot. susp. solids	5.0	mg/L
05 Nov 91	14.5	Tot. susp. solids	6.0	mg/L

Table A.2 (continued)

Date	River mile	Analyte	Result	Units
05 Nov 91	14.5	Turbidity	2.3	NTU
05 Nov 91	20.8	Tot. susp. solids	19.0	mg/L
05 Nov 91	20.8	Turbidity	2.9	NTU
06 Nov 91	14.5	Tot. susp. solids	5.0	mg/L
06 Nov 91	14.5	Turbidity	1.4	NTU
06 Nov 91	20.8	Tot. susp. solids	5.0	mg/L
06 Nov 91	20.8	Turbidity	2.0	NTU
06 Nov 91	20.8	Turbidity	3.4	NTU
06 Nov 91	20.8	Tot. susp. solids	51.0	mg/L
11 Nov 91	20.8	Turbidity	1.2	NTU
11 Nov 91	20.8	Tot. susp. solids	5.0	mg/L
12 Nov 91	14.5	Tot. susp. solids	5.0	mg/L
12 Nov 91	14.5	Turbidity	1.5	NTU
12 Nov 91	20.8	Turbidity	1.9	NTU
12 Nov 91	20.8	Tot. susp. solids	5.0	mg/L
14 Nov 91	14.5	Turbidity	1.2	NTU
14 Nov 91	14.5	Tot. susp. solids	5.0	mg/L
14 Nov 91	20.8	Tot. susp. solids	5.0	mg/L
14 Nov 91	20.8	Turbidity	1.3	NTU
15 Nov 91	20.8	Tot. susp. solids	7.0	mg/L
15 Nov 91	20.8	Turbidity	1.9	NTU
18 Nov 91	20.8	Turbidity	1.4	NTU
18 Nov 91	20.8	Tot. susp. solids	5.0	mg/L
19 Nov 91	14.5	Turbidity	1.7	NTU
19 Nov 91	14.5	Tot. susp. solids	5.0	mg/L
19 Nov 91	20.8	Turbidity	1.4	NTU
19 Nov 91	20.8	Tot. susp. solids	5.0	mg/L
20 Nov 91	20.8	Turbidity	1.4	NTU
20 Nov 91	20.8	Tot. susp. solids	5.0	mg/L
21 Nov 91	14.5	Turbidity	1.2	NTU
21 Nov 91	14.5	Tot. susp. solids	5.0	mg/L

Table A.2 (continued)

Date	River mile	Analyte	Result	Units
02 Dec 91	14.5	Turbidity	2.5	NTU
02 Dec 91	14.5	Tot. susp. solids	6.0	mg/L
02 Dec 91	20.8	Turbidity	20.0	NTU
02 Dec 91	20.8	Tot. susp. solids	37.0	mg/L
03 Dec 91	14.5	Tot. susp. solids	11.0	mg/L
03 Dec 91	14.5	Turbidity	7.2	NTU
03 Dec 91	20.8	Tot. susp. solids	24.0	mg/L
03 Dec 91	20.8	Turbidity	18.0	NTU
04 Dec 91	14.5	Tot. susp. solids	10.0	mg/L
04 Dec 91	14.5	Turbidity	6.8	NTU
04 Dec 91	20.8	Tot. susp. solids	13.0	mg/L
04 Dec 91	20.8	Turbidity	7.9	NTU
05 Dec 91	14.5	Tot. susp. solids	16.0	mg/L
05 Dec 91	14.5	Turbidity	13.0	NTU
05 Dec 91	20.8	Tot. susp. solids	12.0	mg/L
05 Dec 91	20.8	Turbidity	10.0	NTU
06 Dec 91	14.5	Turbidity	20.0	NTU
06 Dec 91	14.5	Tot. susp. solids	21.0	mg/L
06 Dec 91	20.8	Tot. susp. solids	30.0	mg/L
06 Dec 91	20.8	Turbidity	23.0	NTU
09 Dec 91	14.5	Tot. susp. solids	8.0	mg/L
09 Dec 91	14.5	Turbidity	10.0	NTU
09 Dec 91	20.8	Turbidity	10.0	NTU
09 Dec 91	20.8	Tot. susp. solids	7.0	mg/L
10 Dec 91	14.5	Tot. susp. solids	6.0	mg/L
10 Dec 91	14.5	Turbidity	3.5	NTU
12 Dec 91	14.5	Turbidity	2.9	NTU
12 Dec 91	14.5	Tot. susp. solids	6.0	mg/L
13 Dec 91	14.5	Tot. susp. solids	7.0	mg/L
13 Dec 91	14.5	Turbidity	2.3	NTU
16 Dec 91	14.5	Tot. susp. solids	5.0	mg/L

Table A.2 (continued)

Date	River mile	Analyte	Result	Units
16 Dec 91	14.5	Turbidity	4.5	NTU
17 Dec 91	14.5	Turbidity	8.1	NTU
17 Dec 91	14.5	Tot. susp. solids	7.0	mg/L
17 Dec 91	20.8	Turbidity	8.4	NTU
17 Dec 91	20.8	Tot. susp. solids	10.0	mg/L
18 Dec 91	14.5	Turbidity	20.0	NTU
18 Dec 91	14.5	Tot. susp. solids	53.0	mg/L
19 Dec 91	14.5	Tot. susp. solids	8.0	mg/L
19 Dec 91	14.5	Turbidity	5.4	NTU
20 Dec 91	14.5	Turbidity	14.0	NTU
20 Dec 91	14.5	Tot. susp. solids	25.0	mg/L
26 Dec 91	14.5	Tot. susp. solids	6.0	mg/L
26 Dec 91	14.5	Turbidity	4.1	NTU
26 Dec 91	20.8	Tot. susp. solids	8.0	mg/L
26 Dec 91	20.8	Turbidity	4.7	NTU
30 Dec 91	14.5	Tot. susp. solids	49.0	mg/L
30 Dec 91	14.5	Turbidity	3.0	NTU
30 Dec 91	20.8	Turbidity	3.0	NTU
30 Dec 91	20.8	Tot. susp. solids	51.0	mg/L
31 Dec 91	14.5	Tot. susp. solids	36.0	mg/L
31 Dec 91	14.5	Turbidity	16.0	NTU
02 Jan 92	14.5	Turbidity	6.0	NTU
02 Jan 92	14.5	Tot. susp. solids	30.0	mg/L
03 Jan 92	14.5	Tot. susp. solids	12.0	mg/L
03 Jan 92	14.5	Turbidity	5.0	NTU
06 Jan 92	14.5	Tot. susp. solids	36.0	mg/L
06 Jan 92	14.5	Turbidity	13.0	NTU
06 Jan 92	20.8	Tot. susp. solids	8.0	mg/L
06 Jan 92	20.8	Turbidity	5.2	NTU
07 Jan 92	14.5	Turbidity	18.0	NTU
07 Jan 92	14.5	Tot. susp. solids	41.0	mg/L

Table A.2 (continued)

Date	River mile	Analyte	Result	Units
09 Jan 92	14.5	Turbidity	17.0	NTU
09 Jan 92	14.5	Tot. susp. solids	30.0	mg/L
13 Jan 92	14.5	Tot. susp. solids	288.0	mg/L
13 Jan 92	14.5	Turbidity	53.0	NTU
14 Jan 92	14.5	Turbidity	31.0	NTU
14 Jan 92	14.5	Tot. susp. solids	131.0	mg/L
15 Jan 92	14.5	Turbidity	5.0	NTU
15 Jan 92	14.5	Tot. susp. solids	12.0	mg/L
16 Jan 92	14.5	Tot. susp. solids	80.0	mg/L
16 Jan 92	14.5	Turbidity	28.0	NTU
17 Jan 92	14.5	Turbidity	4.3	NTU
17 Jan 92	14.5	Tot. susp. solids	10.0	mg/L
20 Jan 92	14.5	Turbidity	25.0	NTU
20 Jan 92	14.5	Tot. susp. solids	88.0	mg/L
22 Jan 92	14.5	Tot. susp. solids	5.0	mg/L
22 Jan 92	14.5	Turbidity	3.4	NTU
23 Jan 92	14.5	Tot. susp. solids	20.0	mg/L
23 Jan 92	14.5	Turbidity	10.0	NTU
24 Jan 92	14.5	Turbidity	5.0	NTU
24 Jan 92	14.5	Tot. susp. solids	7.0	mg/L
27 Jan 92	14.5	Turbidity	12.0	NTU
27 Jan 92	14.5	Tot. susp. solids	27.0	mg/L
28 Jan 92	14.5	Turbidity	11.0	NTU
28 Jan 92	14.5	Tot. susp. solids	36.0	mg/L
29 Jan 92	14.5	Turbidity	3.0	NTU
29 Jan 92	14.5	Tot. susp. solids	5.0	mg/L
30 Jan 92	14.5	Turbidity	3.0	NTU
30 Jan 92	14.5	Tot. susp. solids	5.0	mg/L
05 Feb 92	20.8	Turbidity	4.1	NTU
05 Feb 92	20.8	Tot. susp. solids	7.0	mg/L
06 Feb 92	20.8	Turbidity	4.5	NTU

Table A.2 (continued)

Date	River mile	Analyte	Result	Units
06 Feb 92	20.8	Tot. susp. solids	7.0	mg/L
08 Feb 92	20.8	Turbidity	4.5	NTU
08 Feb 92	20.8	Tot. susp. solids	8.0	mg/L
11 Feb 92	20.8	Tot. susp. solids	19.0	mg/L
11 Feb 92	20.8	Turbidity	10.0	NTU
12 Feb 92	20.8	Tot. susp. solids	7.0	mg/L
12 Feb 92	20.8	Turbidity	5.0	NTU
18 Feb 92	20.8	Turbidity	5.0	NTU
18 Feb 92	20.8	Tot. susp. solids	5.0	mg/L
19 Feb 92	20.8	Turbidity	10.0	NTU
19 Feb 92	20.8	Tot. susp. solids	10.0	mg/L
21 Feb 92	20.8	Tot. susp. solids	8.0	mg/L
21 Feb 92	20.8	Turbidity	7.0	NTU
21 Feb 92	20.8	Tot. susp. solids	8.0	mg/L
25 Feb 92	20.8	Turbidity	10.0	NTU
25 Feb 92	20.8	Tot. susp. solids	14.0	mg/L
26 Feb 92	20.8	Tot. susp. solids	16.0	mg/L
26 Feb 92	20.8	Turbidity	14.0	NTU
27 Feb 92	14.5	Turbidity	8.0	NTU
27 Feb 92	14.5	Tot. susp. solids	6.0	mg/L
27 Feb 92	20.8	Tot. susp. solids	17.0	mg/L
27 Feb 92	20.8	Turbidity	21.0	NTU
03 Mar 92	14.5	Tot. susp. solids	9.5	mg/L
03 Mar 92	14.5	Turbidity	6.0	NTU
03 Mar 92	20.8	Tot. susp. solids	11.0	mg/L
03 Mar 92	20.8	Turbidity	8.0	NTU
05 Mar 92	14.5	Tot. susp. solids	5.0	mg/L
05 Mar 92	14.5	Turbidity	4.0	NTU
05 Mar 92	20.8	Turbidity	6.0	NTU
05 Mar 92	20.8	Tot. susp. solids	8.0	mg/L
06 Mar 92	14.5	Turbidity	8.5	NTU

Table A.2 (continued)

Date	River mile	Analyte	Result	Units
06 Mar 92	14.5	Tot. susp. solids	18.0	mg/L
06 Mar 92	20.8	Tot. susp. solids	10.0	mg/L
06 Mar 92	20.8	Turbidity	7.5	NTU
10 Mar 92	14.5	Turbidity	4.3	NTU
10 Mar 92	14.5	Tot. susp. solids	7.0	mg/L
10 Mar 92	20.8	Turbidity	10.0	NTU
10 Mar 92	20.8	Tot. susp. solids	13.0	mg/L
17 Mar 92	14.5	Turbidity	5.3	NTU
17 Mar 92	14.5	Tot. susp. solids	9.0	mg/L
18 Mar 92	14.5	Turbidity	6.1	NTU
18 Mar 92	14.5	Tot. susp. solids	9.0	mg/L
18 Mar 92	20.8	Turbidity	7.6	NTU
18 Mar 92	20.8	Tot. susp. solids	14.0	mg/L
19 Mar 92	14.5	Turbidity	10.0	NTU
19 Mar 92	14.5	Tot. susp. solids	28.0	mg/L
19 Mar 92	20.8	Turbidity	11.0	NTU
20 Mar 92	14.5	Turbidity	6.0	NTU
20 Mar 92	14.5	Tot. susp. solids	9.0	mg/L
20 Mar 92	20.8	Tot. susp. solids	19.0	mg/L
20 Mar 92	20.8	Turbidity	15.0	NTU
24 Mar 92	14.5	Turbidity	10.0	NTU
24 Mar 92	14.5	Tot. susp. solids	16.0	mg/L
24 Mar 92	20.8	Turbidity	9.8	NTU
24 Mar 92	20.8	Tot. susp. solids	10.0	mg/L
25 Mar 92	14.5	Turbidity	5.9	NTU
25 Mar 92	14.5	Tot. susp. solids	8.0	mg/L
25 Mar 92	20.8	Turbidity	9.5	NTU
25 Mar 92	20.8	Tot. susp. solids	11.0	mg/L
26 Mar 92	14.5	Turbidity	12.0	NTU
26 Mar 92	14.5	Tot. susp. solids	42.0	mg/L
26 Mar 92	20.8	Tot. susp. solids	24.0	mg/L

Table A.2 (continued)

Date	River mile	Analyte	Result	Units
26 Mar 92	20.8	Turbidity	10.5	NTU
27 Mar 92	20.8	Turbidity	12.5	NTU
27 Mar 92	20.8	Tot. susp. solids	33.0	mg/L
31 Mar 92	14.5	Turbidity	19.0	NTU
31 Mar 92	14.5	Tot. susp. solids	72.0	mg/L
31 Mar 92	20.8	Turbidity	7.5	NTU
31 Mar 92	20.8	Tot. susp. solids	11.0	mg/L
01 Apr 92	14.5	Tot. susp. solids	72.0	mg/L
01 Apr 92	14.5	Turbidity	21.0	NTU
01 Apr 92	20.8	Tot. susp. solids	5.0	mg/L
01 Apr 92	20.8	Turbidity	28.0	NTU
02 Apr 92	14.5	Turbidity	4.6	NTU
02 Apr 92	14.5	Tot. susp. solids	7.0	mg/L
02 Apr 92	20.8	Turbidity	10.0	NTU
02 Apr 92	20.8	Tot. susp. solids	13.0	mg/L
07 Apr 92	14.5	Turbidity	11.5	NTU
07 Apr 92	14.5	Tot. susp. solids	35.0	mg/L
07 Apr 92	20.8	Turbidity	9.0	NTU
07 Apr 92	20.8	Tot. susp. solids	10.0	mg/L
08 Apr 92	14.5	Tot. susp. solids	12.0	mg/L
08 Apr 92	14.5	Turbidity	5.0	NTU
08 Apr 92	20.8	Tot. susp. solids	14.0	mg/L
08 Apr 92	20.8	Turbidity	9.0	NTU
09 Apr 92	14.5	Turbidity	10.0	NTU
09 Apr 92	14.5	Tot. susp. solids	32.0	mg/L
09 Apr 92	20.8	Tot. susp. solids	5.0	mg/L
09 Apr 92	20.8	Turbidity	5.5	NTU
10 Apr 92	14.5	Turbidity	4.2	NTU
10 Apr 92	14.5	Tot. susp. solids	12.0	mg/L
10 Apr 92	20.8	Tot. susp. solids	11.0	mg/L
10 Apr 92	20.8	Turbidity	6.0	NTU

Table A.2 (continued)

Date	River mile	Analyte	Result	Units
14 Apr 92	14.5	Tot. susp. solids	19.0	mg/L
14 Apr 92	14.5	Turbidity	7.8	NTU
15 Apr 92	14.5	Turbidity	6.0	NTU
15 Apr 92	14.5	Tot. susp. solids	16.0	mg/L
15 Apr 92	20.8	Turbidity	26.0	NTU
15 Apr 92	20.8	Tot. susp. solids	22.0	mg/L
16 Apr 92	14.5	Tot. susp. solids	33.0	mg/L
16 Apr 92	14.5	Turbidity	12.0	NTU
16 Apr 92	20.8	Tot. susp. solids	12.0	mg/L
16 Apr 92	20.8	Turbidity	15.0	NTU
22 Apr 92	14.5	Tot. susp. solids	21.0	mg/L
22 Apr 92	14.5	Turbidity	8.0	NTU
22 Apr 92	20.8	Tot. susp. solids	5.0	mg/L
22 Apr 92	20.8	Turbidity	3.9	NTU
29 Apr 92	14.5	Tot. susp. solids	11.0	mg/L
29 Apr 92	14.5	Turbidity	4.8	NTU
29 Apr 92	20.8	Turbidity	3.0	NTU
29 Apr 92	20.8	Tot. susp. solids	7.0	mg/L
06 May 92	14.5	Turbidity	6.3	NTU
06 May 92	14.5	Tot. susp. solids	21.0	mg/L
06 May 92	20.8	Turbidity	1.9	NTU
06 May 92	20.8	Tot. susp. solids	5.0	mg/L
13 May 92	14.5	Turbidity	18.0	NTU
13 May 92	14.5	Tot. susp. solids	64.0	mg/L
13 May 92	20.8	Turbidity	2.0	NTU
13 May 92	20.8	Tot. susp. solids	5.0	mg/L
20 May 92	14.5	Turbidity	2.3	NTU
20 May 92	14.5	Tot. susp. solids	7.0	mg/L
20 May 92	20.8	Turbidity	1.6	NTU
20 May 92	20.8	Tot. susp. solids	5.0	mg/L
28 May 92	14.5	Turbidity	12.0	NTU

Table A.2 (continued)

Date	River mile	Analyte	Result	Units
28 May 92	14.5	Tot. susp. solids	72.0	mg/L
28 May 92	20.8	Turbidity	1.7	NTU
28 May 92	20.8	Tot. susp. solids	5.0	mg/L
04 Jun 92	14.5	Turbidity	3.6	NTU
04 Jun 92	14.5	Tot. susp. solids	25.0	mg/L
04 Jun 92	20.8	Tot. susp. solids	5.0	mg/L
04 Jun 92	20.8	Turbidity	1.4	NTU
10 Jun 92	14.5	Tot. susp. solids	5.0	mg/L
10 Jun 92	14.5	Turbidity	2.5	NTU
10 Jun 92	20.8	Tot. susp. solids	5.0	mg/L
10 Jun 92	20.8	Turbidity	1.7	NTU
17 Jun 92	14.5	Tot. susp. solids	6.0	mg/L
17 Jun 92	14.5	Turbidity	3.2	NTU
17 Jun 92	20.8	Turbidity	2.7	NTU
17 Jun 92	20.8	Tot. susp. solids	5.0	mg/L
24 Jun 92	14.5	Tot. susp. solids	6.0	mg/L
24 Jun 92	14.5	Turbidity	5.5	NTU
24 Jun 92	20.8	Turbidity	2.5	NTU
24 Jun 92	20.8	Tot. susp. solids	5.0	mg/L
01 Jul 92	14.5	Tot. susp. solids	37.0	mg/L
01 Jul 92	14.5	Turbidity	9.0	NTU
01 Jul 92	20.8	Tot. susp. solids	5.0	mg/L
01 Jul 92	20.8	Turbidity	3.0	NTU
08 Jul 92	14.5	Tot. susp. solids	7.0	mg/L
08 Jul 92	14.5	Turbidity	3.9	NTU
08 Jul 92	20.8	Turbidity	4.7	NTU
08 Jul 92	20.8	Tot. susp. solids	5.0	mg/L
15 Jul 92	14.5	Tot. susp. solids	5.0	mg/L
15 Jul 92	14.5	Turbidity	3.1	NTU
15 Jul 92	20.8	Turbidity	3.8	NTU
15 Jul 92	20.8	Tot. susp. solids	9.0	mg/L

Table A.2 (continued)

Date	River mile	Analyte	Result	Units
23 Jul 92	14.5	Turbidity	55.0	NTU
23 Jul 92	14.5	Tot. susp. solids	363.0	mg/L
23 Jul 92	20.8	Tot. susp. solids	5.0	mg/L
23 Jul 92	20.8	Turbidity	2.9	NTU
29 Jul 92	20.8	Tot. susp. solids	6.0	mg/L
29 Jul 92	20.8	Tot. susp. solids	5.0	mg/L
29 Jul 92	20.8	Turbidity	2.5	NTU
29 Jul 92	20.8	Turbidity	4.0	NTU

Table A.3. Composite sampler particle-associated ^{137}Cs results

Date	River mile	TSP result	Error	Units	^{137}Cs result	Rad error	Unit
18 Sep 91	20.8				1.92	1.22	pCi/L
18 Sep 91	20.8	5.0		mg/L	135.15	0.00	pCi/g
19 Sep 91	20.8				0.22	1.24	pCi/L
19 Sep 91	20.8	5.0		mg/L	43.25	248.68	pCi/g
19 Sep 91	14.5				1.00	0.59	pCi/L
19 Sep 91	14.5	11.0		mg/L	90.92	54.06	pCi/g
20 Sep 91	20.8				1.73	0.70	pCi/L
20 Sep 91	20.8	5.0		mg/L	345.98	140.56	pCi/g
23 Sep 91	20.8				1.08	1.62	pCi/L
23 Sep 91	20.8	5.0		mg/L	216.24	324.36	pCi/g
24 Sep 91	20.8				2.00	0.89	pCi/L
24 Sep 91	20.8	5.0		mg/L	400.04	178.40	pCi/g
24 Sep 91	14.5				-0.05	1.30	pCi/L
24 Sep 91	14.5	5.0		mg/L	-10.81	259.49	pCi/g
25 Sep 91	20.8				1.65	0.81	pCi/L
25 Sep 91	20.8	5.0		mg/L	329.77	162.18	pCi/g
25 Sep 91	14.5				-0.08	0.59	pCi/L
25 Sep 91	14.5	5.0		mg/L	-16.22	118.93	pCi/g
26 Sep 91	20.8				4.05	1.35	pCi/L
26 Sep 91	20.8	5.0		mg/L	810.90	270.30	pCi/g
26 Sep 91	14.5				0.54	0.22	pCi/L
26 Sep 91	14.5	5.0		mg/L	108.12	43.25	pCi/g
27 Sep 91	20.8				1.27	1.03	pCi/L
27 Sep 91	20.8	5.0		mg/L	254.08	205.43	pCi/g
27 Sep 91	14.5				0.68	0.78	pCi/L
27 Sep 91	14.5	5.0		mg/L	135.15	156.77	pCi/g
30 Sep 91	20.8				0.35	0.65	pCi/L
30 Sep 91	20.8	5.0		mg/L	70.28	129.74	pCi/g
30 Sep 91	14.5				0.46	0.19	pCi/L
30 Sep 91	14.5	5.0		mg/L	91.90	37.84	pCi/g

Table A.3 (continued)

Date	River mile	TSP result	Error	Units	^{137}Cs result	Rad error	Unit
01 Oct 91	20.8				0.84	1.05	pCi/L
01 Oct 91	20.8	5.0		mg/L	167.59	210.83	pCi/g
01 Oct 91	14.5				-0.32	0.78	pCi/L
01 Oct 91	14.5	5.0		mg/L	-64.87	156.77	pCi/g
02 Oct 91	20.8				0.73	1.32	pCi/L
02 Oct 91	20.8	5.0		mg/L	145.96	264.89	pCi/g
02 Oct 91	14.5				0.05	0.81	pCi/L
02 Oct 91	14.5	5.0		mg/L	10.81	162.18	pCi/g
03 Oct 91	20.8				0.32	0.73	pCi/L
03 Oct 91	20.8	5.0		mg/L	64.87	145.96	pCi/g
03 Oct 91	14.5				0.35	0.84	pCi/L
03 Oct 91	14.5	5.0		mg/L	70.28	167.59	pCi/g
04 Oct 91	20.8				0.14	1.05	pCi/L
04 Oct 91	20.8	5.0		mg/L	27.03	210.83	pCi/g
04 Oct 91	14.5				0.14	1.30	pCi/L
04 Oct 91	14.5	5.0		mg/L	27.03	259.49	pCi/g
07 Oct 91	20.8				-0.38	1.35	pCi/L
07 Oct 91	20.8	5.0		mg/L	-75.68	270.30	pCi/g
07 Oct 91	14.5				0.43	0.70	pCi/L
07 Oct 91	14.5	5.0		mg/L	86.50	140.56	pCi/g
29 Oct 91	20.8				0.27	0.65	pCi/L
29 Oct 91	20.8	2.0		mg/L	135.15	324.36	pCi/g
29 Oct 91	14.5				0.54	0.59	pCi/L
29 Oct 91	14.5	5.0		mg/L	108.12	118.93	pCi/g
30 Oct 91	20.8				3.24	0.54	pCi/L
30 Oct 91	20.8	6.0		mg/L	540.60	90.10	pCi/g
31 Oct 91	20.8				0.35	0.89	pCi/L
31 Oct 91	20.8	5.0		mg/L	70.28	178.40	pCi/g
31 Oct 91	14.5				0.22	0.51	pCi/L
31 Oct 91	14.5	5.0		mg/L	43.25	102.71	pCi/g
01 Nov 91	20.8				0.14	0.86	pCi/L

Table A.3 (continued)

Date	River mile	TSP result	Error	Units	¹³⁷ Cs result	Rad error	Unit
01 Nov 91	20.8	5.0		mg/L	27.03	172.99	pCi/g
04 Nov 91	20.8				0.41	0.81	pCi/L
04 Nov 91	20.8	5.0		mg/L	81.09	162.18	pCi/g
05 Nov 91	20.8				-0.11	1.22	pCi/L
05 Nov 91	20.8	19.0		mg/L	-5.69	64.02	pCi/g
05 Nov 91	14.5				0.49	0.73	pCi/L
05 Nov 91	14.5	6.0		mg/L	81.09	121.64	pCi/g
06 Nov 91	20.8				22.16	4.87	pCi/L
06 Nov 91	20.8	51.0		mg/L	434.60	95.40	pCi/g
06 Nov 91	20.8				2.38	0.68	pCi/L
06 Nov 91	20.8	5.0		mg/L	475.73	135.15	pCi/g
06 Nov 91	14.5				0.46	0.65	pCi/L
06 Nov 91	14.5	5.0		mg/L	91.90	129.74	pCi/g
07 Nov 91	20.8				0.62	0.86	pCi/L
11 Nov 91	20.8				1.11	0.84	pCi/L
11 Nov 91	20.8	5.0		mg/L	221.65	167.59	pCi/g
15 Nov 91	20.8				0.46	1.30	pCi/L
15 Nov 91	20.8	7.0		mg/L	65.64	185.35	pCi/g
18 Nov 91	20.8				-2.70	54.06	pCi/L
18 Nov 91	20.8	5.0		mg/L	-540.60	10812.00	pCi/g
19 Nov 91	20.8				1.30	2.00	pCi/L
19 Nov 91	20.8	5.0		mg/L	259.49	400.04	pCi/g
19 Nov 91	14.5				-0.22	1.38	pCi/L
19 Nov 91	14.5	5.0		mg/L	-43.25	275.71	pCi/g
20 Nov 91	20.8				3.24	0.81	pCi/L
20 Nov 91	20.8	5.0		mg/L	648.72	162.18	pCi/g
02 Dec 91	20.8				27.03	5.41	pCi/L
02 Dec 91	20.8	37.0	37.0	mg/L	730.54	146.11	pCi/g
02 Dec 91	14.5				0.05	1.24	pCi/L
02 Dec 91	14.5	6.0	6.0	mg/L	9.01	207.23	pCi/g
03 Dec 91	20.8				24.33	2.97	pCi/L

Table A.3 (continued)

Date	River mile	TSP result	Error	Units	¹³⁷ Cs result	Rad error	Unit
03 Dec 91	20.8	24.0	24.0	mg/L	1013.63	123.89	pCi/g
03 Dec 91	14.5				1.38	1.62	pCi/L
03 Dec 91	14.5	11.0	11.0	mg/L	125.32	147.44	pCi/g
04 Dec 91	20.8				7.30	2.97	pCi/L
04 Dec 91	20.8	13.0	13.0	mg/L	561.39	228.72	pCi/g
04 Dec 91	14.5				0.22	2.68	pCi/L
04 Dec 91	14.5	10.0	10.0	mg/L	21.62	267.60	pCi/g
05 Dec 91	20.8				2.70	1.35	pCi/L
05 Dec 91	20.8	12.0	12.0	mg/L	225.25	112.63	pCi/g
05 Dec 91	14.5				0.43	1.03	pCi/L
05 Dec 91	14.5	16.0	16.0	mg/L	27.03	64.20	pCi/g
06 Dec 91	20.8				0.54	2.70	pCi/L
06 Dec 91	20.8	30.0		mg/L	18.02	90.10	pCi/g
06 Dec 91	14.5				1.54	2.46	pCi/L
06 Dec 91	14.5	21.0	21.0	mg/L	73.37	117.13	pCi/g
09 Dec 91	14.5				0.92	1.41	pCi/L
09 Dec 91	14.5	8.0	8.0	mg/L	114.88	175.70	pCi/g
10 Dec 91	14.5				1.05	0.62	pCi/L
10 Dec 91	14.5	6.0	6.0	mg/L	175.70	103.62	pCi/g
12 Dec 91	14.5				0.30	0.81	pCi/L
12 Dec 91	14.5	6.0		mg/L	49.56	135.15	pCi/g
13 Dec 91	14.5				0.30	1.73	pCi/L
13 Dec 91	14.5	7.0		mg/L	42.48	247.13	pCi/g
16 Dec 91	14.5				-0.05	1.19	pCi/L
16 Dec 91	14.5	5.0		mg/L	-10.81	237.86	pCi/g
17 Dec 91	20.8				-0.32	2.30	pCi/L
17 Dec 91	20.8	10.0		mg/L	-32.44	229.76	pCi/g
17 Dec 91	14.5				0.11	1.24	pCi/L
17 Dec 91	14.5	7.0		mg/L	15.45	177.63	pCi/g
18 Dec 91	14.5				0.32	1.00	pCi/L
18 Dec 91	14.5	53.0		mg/L	6.12	18.87	pCi/g

Table A.3 (continued)

Date	River mile	TSP result	Error	Units	¹³⁷ Cs result	Rad error	Unit
19 Dec 91	14.5				0.24	0.89	pCi/L
19 Dec 91	14.5	8.0		mg/L	30.41	111.50	pCi/g
20 Dec 91	14.5				1.08	1.08	pCi/L
20 Dec 91	14.5	25.0		mg/L	43.25	43.25	pCi/g
26 Dec 91	20.8				0.24	1.41	pCi/L
26 Dec 91	20.8	8.0		mg/L	30.41	175.70	pCi/g
26 Dec 91	14.5				0.08	1.35	pCi/L
26 Dec 91	14.5	6.0		mg/L	13.52	225.25	pCi/g
30 Dec 91	20.8				2.51	1.78	pCi/L
30 Dec 91	20.8	51.0		mg/L	49.29	34.98	pCi/g
30 Dec 91	14.5				1.43	1.19	pCi/L
30 Dec 91	14.5	49.0		mg/L	29.24	24.27	pCi/g
31 Dec 91	14.5				1.03	0.97	pCi/L
31 Dec 91	14.5	36.0		mg/L	28.53	27.03	pCi/g
02 Jan 92	14.5				0.49	0.54	pCi/L
02 Jan 92	14.5	30.0		mg/L	16.22	18.02	pCi/g
03 Jan 92	14.5				0.46	0.57	pCi/L
03 Jan 92	14.5	12.0		mg/L	38.29	47.30	pCi/g
06 Jan 92	20.8				1.00	2.11	pCi/L
06 Jan 92	20.8	8.0		mg/L	125.01	263.54	pCi/g
06 Jan 92	14.5				0.89	1.03	pCi/L
06 Jan 92	14.5	36.0		mg/L	24.78	28.53	pCi/g
07 Jan 92	14.5				0.97	0.84	pCi/L
07 Jan 92	14.5	41.0		mg/L	23.73	20.44	pCi/g
09 Jan 92	14.5				1.05	1.19	pCi/L
09 Jan 92	14.5	30.0		mg/L	35.14	39.64	pCi/g
13 Jan 92	14.5				2.00	1.19	pCi/L
13 Jan 92	14.5	288.0		mg/L	6.95	4.13	pCi/g
14 Jan 92	14.5				2.38	0.59	pCi/L
14 Jan 92	14.5	131.0		mg/L	18.16	4.54	pCi/g
15 Jan 92	14.5				0.65	1.32	pCi/L

Table A.3 (continued)

Date	River mile	TSP result	Error	Units	¹³⁷ Cs result	Rad error	Unit
15 Jan 92	14.5	12.0		mg/L	54.06	110.37	pCi/g
16 Jan 92	14.5				1.35	1.27	pCi/L
16 Jan 92	14.5	80.0		mg/L	16.89	15.88	pCi/g
17 Jan 92	14.5				0.30	1.00	pCi/L
17 Jan 92	14.5	10.0		mg/L	29.73	100.01	pCi/g
20 Jan 92	14.5				2.97	0.81	pCi/L
20 Jan 92	14.5	88.0		mg/L	33.79	9.21	pCi/g
21 Jan 92	14.5				0.57	1.30	pCi/L
21 Jan 92	20.8	28.0		mg/L	20.27	46.34	pCi/g
22 Jan 92	14.5				0.46	0.84	pCi/L
22 Jan 92	14.5	5.0		mg/L	91.90	167.59	pCi/g
23 Jan 92	14.5				0.68	0.76	pCi/L
23 Jan 92	14.5	20.0		mg/L	33.79	37.84	pCi/g
24 Jan 92	14.5				0.08	0.92	pCi/L
24 Jan 92	14.5	7.0		mg/L	11.58	131.29	pCi/g
27 Jan 92	14.5				0.92	0.59	pCi/L
27 Jan 92	14.5	27.0		mg/L	34.04	22.02	pCi/g
28 Jan 92	14.5				0.78	0.54	pCi/L
28 Jan 92	14.5	36.0		mg/L	21.77	15.02	pCi/g
29 Jan 92	14.5				0.14	0.76	pCi/L
29 Jan 92	14.5	5.0		mg/L	27.03	151.37	pCi/g
30 Jan 92	14.5				0.30	0.62	pCi/L
30 Jan 92	14.5	5.0		mg/L	59.47	124.34	pCi/g
05 Feb 92	20.8				5.14	1.08	pCi/L
05 Feb 92	20.8	7.0		mg/L	733.67	154.46	pCi/g
06 Feb 92	20.8				2.57	0.78	pCi/L
06 Feb 92	20.8	7.0		mg/L	366.84	111.98	pCi/g
07 Feb 92	20.8				2.57	1.87	pCi/L
07 Feb 92	20.8	8.0		mg/L	320.98	233.13	pCi/g
12 Feb 92	20.8				7.30	1.35	pCi/L
12 Feb 92	20.8	7.0		mg/L	1042.59	193.07	pCi/g

Table A.3 (continued)

Date	River mile	TSP result	Error	Units	^{137}Cs result	Rad error	Unit
18 Feb 92	20.8				2.97	1.35	pCi/L
18 Feb 92	20.8	5.0		mg/L	594.66	270.30	pCi/g
19 Feb 92	20.8				14.33	1.89	pCi/L
19 Feb 92	20.8	10.0		mg/L	1432.59	189.21	pCi/g
21 Feb 92	20.8				16.49	2.16	pCi/L
21 Feb 92	20.8	8.0		mg/L	2061.04	270.30	pCi/g
25 Feb 92	20.8				43.25	5.41	pCi/L
25 Feb 92	20.8	14.0		mg/L	3089.14	386.14	pCi/g
26 Feb 92	20.8				32.44	2.70	pCi/L
26 Feb 92	20.8	16.0		mg/L	2027.25	168.94	pCi/g
27 Feb 92	20.8				26.22	4.32	pCi/L
27 Feb 92	20.8	17.0		mg/L	1542.30	254.40	pCi/g
03 Mar 92	20.8				20.54	1.89	pCi/L
03 Mar 92	20.8	11.0		mg/L	1867.53	172.01	pCi/g
05 Mar 92	20.8				26.49	2.43	pCi/L
05 Mar 92	20.8	8.0		mg/L	3311.18	304.09	pCi/g
06 Mar 92	20.8				20.27	1.62	pCi/L
06 Mar 92	20.8	10.0		mg/L	2027.25	162.18	pCi/g
10 Mar 92	20.8				23.25	1.89	pCi/L
10 Mar 92	20.8	13.0		mg/L	1788.14	145.55	pCi/g
18 Mar 92	20.8				16.49	1.62	pCi/L
18 Mar 92	20.8	14.0		mg/L	1177.74	115.84	pCi/g
19 Mar 92	20.8				32.44	2.70	pCi/L
19 Mar 92	20.8	19.0		mg/L	1707.16	142.26	pCi/g
20 Mar 92	20.8				43.25	2.70	pCi/L
20 Mar 92	20.8	19.0		mg/L	2276.21	142.26	pCi/g
24 Mar 92	20.8				25.68	2.16	pCi/L
24 Mar 92	20.8	10.0		mg/L	2567.85	216.24	pCi/g
25 Mar 92	20.8				19.46	1.62	pCi/L
25 Mar 92	20.8	11.0		mg/L	1769.24	147.44	pCi/g
26 Mar 92	20.8				17.30	1.62	pCi/L

Table A.3 (continued)

Date	River mile	TSP result	Error	Units	¹³⁷ Cs result	Rad error	Unit
26 Mar 92	20.8	24.0		mg/L	720.80	67.58	pCi/g
26 Mar 92	14.5				1.27	0.78	pCi/L
26 Mar 92	14.5	42.0		mg/L	30.25	18.66	pCi/g
27 Mar 92	20.8				62.17	2.70	pCi/L
27 Mar 92	20.8	33.0		mg/L	1883.91	81.91	pCi/g
31 Mar 92	20.8				29.73	2.70	pCi/L
31 Mar 92	20.8	11.0		mg/L	2703.00	245.73	pCi/g
01 Apr 92	20.8				1.97	0.95	pCi/L
01 Apr 92	20.8	5.0		mg/L	394.64	189.21	pCi/g
02 Apr 92	20.8				37.84	2.70	pCi/L
02 Apr 92	20.8	13.0		mg/L	2910.92	207.92	pCi/g
02 Apr 92	14.5				1.57	0.95	pCi/L
02 Apr 92	14.5	7.0		mg/L	223.96	135.15	pCi/g
07 Apr 92	20.8				25.41	2.16	pCi/L
07 Apr 92	20.8	10.0		mg/L	2540.82	216.24	pCi/g
08 Apr 92	20.8				27.03	2.70	pCi/L
08 Apr 92	20.8	14.0		mg/L	1930.71	193.07	pCi/g
08 Apr 92	14.5				2.97	1.08	pCi/L
08 Apr 92	14.5	12.0		mg/L	247.78	90.10	pCi/g
09 Apr 92	20.8				24.60	1.89	pCi/L
09 Apr 92	20.8	5.0		mg/L	4919.46	378.42	pCi/g
09 Apr 92	14.5				2.43	4.05	pCi/L
09 Apr 92	14.5	32.0		mg/L	76.02	126.70	pCi/g
10 Apr 92	20.8				32.44	2.70	pCi/L
10 Apr 92	20.8	11.0		mg/L	2948.73	245.73	pCi/g
10 Apr 92	14.5				1.68	0.65	pCi/L
10 Apr 92	14.5	12.0		mg/L	139.66	54.06	pCi/g
16 Apr 92	20.8				18.11	1.62	pCi/L
16 Apr 92	20.8	12.0	12.0	mg/L	1509.18	135.15	pCi/g

Appendix B

ROUTINE WATER QUALITY AND CONTAMINANT RESULTS FROM THE WHITE OAK DAM MONITORING STATION

Table B.1. Radiological data for White Oak Dam outflows, June 1991 though June 1992.
Data provided by ORNL Environmental Monitoring and Compliance.

SAMP DATE	⁶⁰ Co pCi/L	⁶⁰ Co err	¹³⁷ Cs pCi/L	¹³⁷ Cs err	Gross alpha pCi/L	Alpha err	Gross beta pCi/L
05 Jun 91	5.14	2.97	26.76	3.24	5.95	4.05	378.42
12 Jun 91	-0.54	13.79	78.39	10.81	32.44	8.11	486.54
19 Jun 91	4.32	6.22	43.25	5.41	8.11	4.60	351.39
26 Jun 91	8.92	7.03	105.42	13.52	4.60	2.70	378.42
03 Jul 91	-0.27	6.49	20.27	3.24	6.22	2.97	405.45
10 Jul 91	0.81	6.49	37.84	5.41	4.87	2.43	405.45
17 Jul 91	2.70	40.55	513.57	54.06	6.49	3.78	459.51
24 Jul 91	10.00	9.46	64.87	13.52	9.19	3.78	486.54
31 Jul 91	-2.70	16.22	37.84	13.52	15.14	5.14	1135.26
07 Aug 91	6.76	10.54	24.33	10.27	6.76	2.97	351.39
14 Aug 91	7.84	10.54	78.39	13.52	3.51	2.43	432.48
21 Aug 91	2.70	7.30	124.34	8.11	4.60	2.70	297.33
28 Aug 91	4.87	2.97	89.20	5.41	7.03	3.24	224.35
04 Sep 91	0.81	10.00	29.73	10.81	3.78	2.43	205.43
11 Sep 91	-2.97	6.22	40.55	5.41	5.14	2.97	267.60
18 Sep 91	4.32	2.43	94.60	5.41	5.14	3.78	540.60
25 Sep 91	8.11	19.73	37.84	10.81	5.14	2.97	378.42
02 Oct 91	3.78	2.16	91.90	5.41	9.73	3.78	432.48
09 Oct 91	4.87	2.70	75.68	5.41	2.24	2.05	324.36
16 Oct 91	1.89	7.84	40.55	5.41	8.11	3.51	324.36
23 Oct 91	4.60	3.51	56.76	5.41	6.49	3.24	486.54
30 Oct 91	2.16	3.24	40.55	2.70	16.49	5.14	297.33

SAMP DATE	Beta err	Total Sr pCi/L	Sr err	³ H pCi/L	³ H err
05 Jun 91	27.03	.	.	.	.
12 Jun 91	27.03	.	.	.	.
19 Jun 91	27.03	.	.	.	.
26 Jun 91	27.03	202.73	9.46	137853	2703
03 Jul 91	27.03	.	.	.	.
10 Jul 91	27.03	.	.	.	.
17 Jul 91	27.03	.	.	.	.
24 Jul 91	27.03	.	.	.	.
31 Jul 91	27.03	675.75	54.06	100011	2703
07 Aug 91	27.03	.	.	.	.
14 Aug 91	27.03	.	.	.	.
21 Aug 91	27.03	.	.	.	.
28 Aug 91	13.52	181.10	12.43	72981	24327
04 Sep 91	13.52	.	.	.	.
11 Sep 91	16.22	.	.	.	.
18 Sep 91	27.03	.	.	.	.
25 Sep 91	27.03	110.82	7.57	54060	2703
02 Oct 91	27.03	.	.	.	.
09 Oct 91	27.03	.	.	.	.
16 Oct 91	27.03	.	.	.	.
23 Oct 91	27.03	.	.	.	.
30 Oct 91	27.03	154.07	11.62	72981	2703

Table B.1 (continued)

SAMP DATE	⁶⁰ Co pCi/L	⁶⁰ Co err	¹³⁷ Cs pCi/L	¹³⁷ Cs err	Gross alpha pCi/L	Alpha err	Gross beta pCi/L
06 Nov 91	5.14	2.16	86.50	5.41	8.65	3.78	297.33
13 Nov 91	0.27	4.05	27.03	2.70	5.41	2.97	243.27
20 Nov 91	4.05	7.03	48.65	2.70	4.60	2.70	270.30
27 Nov 91	4.32	2.43	45.95	2.70	4.60	3.78	378.42
04 Dec 91	62.17	8.11	6.49	5.41	6.49	3.24	432.48
11 Dec 91	4.87	2.43	72.98	2.70	6.76	3.24	513.57
18 Dec 91	5.14	3.24	23.52	2.97	4.05	3.51	540.60
26 Dec 91	10.81	6.22	32.44	10.81	11.08	5.68	405.45
31 Dec 91	2.97	3.24	26.49	2.97	4.05	2.70	459.51
08 Jan 92	6.76	7.84	35.14	8.11	13.79	6.22	486.54
15 Jan 92	2.70	59.47	145.96	40.55	7.03	3.24	486.54
22 Jan 92	3.24	6.22	21.08	4.87	6.22	4.32	459.51
29 Jan 92	10.27	6.76	40.55	8.11	8.92	3.78	513.57
05 Feb 92	3.78	3.78	22.98	3.78	10.54	4.05	432.48
12 Feb 92	7.57	3.78	15.14	4.05	7.57	4.60	459.51
19 Feb 92	8.11	35.14	72.98	24.33	7.03	4.32	567.63
26 Feb 92	20.81	21.62	191.91	35.14	9.19	5.14	675.75
04 Mar 92	1.35	5.14	40.55	5.41	13.52	5.14	513.57
11 Mar 92	8.11	27.03	154.07	32.44	5.95	4.05	405.45
19 Mar 92	11.35	7.84	113.53	13.52	9.19	3.51	486.54
25 Mar 92	5.41	3.24	75.68	5.41	7.03	3.24	459.51
02 Apr 92	9.46	19.19	51.36	16.22	18.11	8.65	432.48

SAMP DATE	Beta err	Total Sr pCi/L	Sr err	³ H pCi/L	³ H err
06 Nov 91	27.03	.	.	.	.
13 Nov 91	16.22	.	.	.	.
20 Nov 91	27.03	.	.	.	.
27 Nov 91	27.03	.	.	.	.
04 Dec 91	27.03	175.69	11.35	108120	2703
11 Dec 91	27.03	.	.	.	.
18 Dec 91	27.03	.	.	.	.
26 Dec 91	27.03	.	.	.	.
31 Dec 91	27.03	262.19	11.35	229755	2703
08 Jan 92	27.03	.	.	.	.
15 Jan 92	27.03	.	.	.	.
22 Jan 92	27.03	.	.	.	.
29 Jan 92	27.03	224.35	10.27	297330	27030
05 Feb 92	27.03	.	.	.	.
12 Feb 92	27.03	.	.	.	.
19 Feb 92	27.03	.	.	.	.
26 Feb 92	27.03	324.36	19.19	351390	27030
04 Mar 92	27.03	.	.	.	.
11 Mar 92	27.03	.	.	.	.
19 Mar 92	27.03	.	.	.	.
25 Mar 92	27.03	227.05	12.43	248676	2703
02 Apr 92	27.03	.	.	.	.

Table B.1 (continued)

SAMP DATE	⁶⁰ Co pCi/L	⁶⁰ Co err	¹³⁷ Cs pCi/L	¹³⁷ Cs err	Gross alpha pCi/L	Alpha err	Gross beta pCi/L
08 Apr 92	-1.89	15.41	64.87	10.81	12.43	4.32	486.54
16 Apr 92	5.95	2.43	159.48	5.41	11.35	4.05	729.81
22 Apr 92	5.95	2.70	118.93	5.41	10.54	16.76	540.60
29 Apr 92	8.38	8.38	51.36	10.81	9.46	3.78	459.51
06 May 92	5.95	2.97	94.60	5.41	2.97	2.97	213.54
13 May 92	10.81	2.70	22.71	6.49	8.11	3.51	432.48
20 May 92	4.32	2.43	56.76	2.70	8.11	4.32	486.54
27 May 92	4.87	5.41	64.87	5.41	5.95	3.24	864.96
03 Jun 92	5.95	4.32	51.36	5.41	4.32	3.78	756.84
10 Jun 92	4.32	4.60	27.03	5.41	3.78	2.43	486.54
17 Jun 92	6.49	3.78	86.50	5.41	9.19	3.78	324.36
24 Jun 92	3.24	12.16	37.84	10.81	2.97	3.24	378.42
01 Jul 92	1.08	6.49	54.06	8.11	2.70	13.52	459.51
08 Jul 92	3.51	4.60	59.47	5.41	8.11	5.14	648.72
15 Jul 92	-1.08	3.78	25.14	3.24	9.73	3.51	567.63
22 Jul 92	0.54	7.30	32.44	5.41	2.97	3.24	405.45
29 Jul 92	-0.27	7.57	37.84	5.41	8.11	3.51	378.42

SAMP DATE	Beta err	Total Sr pCi/L	Sr err	³ H pCi/L	³ H err
08 Apr 92	27.03	.	.	.	.
16 Apr 92	27.03	.	.	.	.
22 Apr 92	81.09	.	.	.	.
29 Apr 92	27.03	267.60	16.49	297330	27030
06 May 92	21.62	.	.	.	.
13 May 92	27.03	.	.	.	.
20 May 92	27.03	.	.	.	.
27 May 92	27.03	459.51	27.03	208131	2703
03 Jun 92	27.03	.	.	.	.
10 Jun 92	27.03	.	.	.	.
17 Jun 92	27.03	.	.	.	.
24 Jun 92	27.03	208.13	9.46	135150	2703
01 Jul 92	108.12	.	.	.	.
08 Jul 92	27.03	.	.	.	.
15 Jul 92	27.03	.	.	.	.
22 Jul 92	27.03	.	.	.	.
29 Jul 92	27.03	245.97	13.24	108120	2703

**Table B.2. White Oak Dam physical-chemical parameters,
June 1991 through July 1992.** Data for temperature
(TEMP), conductivity (COND), turbidity (TURB),
total dissolved solids (TDS), and total
suspended solids (TSS) provided by
ORNL Environmental Monitoring
and Compliance.

Month	Date	Analysis	Value	Units
6	04 Jun 91	TEMP	26.1	°C
6	06 Jun 91	COND	1.6	mS/cm
6	06 Jun 91	TDS	175.0	mg/L
6	06 Jun 91	TEMP	25.5	°C
6	06 Jun 91	TSS	19.0	mg/L
6	06 Jun 91	TURB	30.0	JTU
6	11 Jun 91	TEMP	25.2	°C
6	18 Jun 91	TEMP	29.3	°C
6	25 Jun 91	TEMP	23.5	°C
7	02 Jul 91	TEMP	27.4	°C
7	09 Jul 91	TEMP	27.2	°C
7	11 Jul 91	COND	1.8	mS/cm
7	11 Jul 91	TDS	231.0	mg/L
7	11 Jul 91	TEMP	28.7	°C
7	11 Jul 91	TSS	29.0	mg/L
7	11 Jul 91	TURB	22.0	JTU
7	16 Jul 91	TEMP	27.7	°C
7	23 Jul 91	TEMP	29.7	°C
7	30 Jul 91	TEMP	27.1	°C
8	06 Aug 91	TEMP	25.10	°C
8	08 Aug 91	COND	0.36	mS/cm
8	08 Aug 91	TDS	179.00	mg/L
8	08 Aug 91	TEMP	28.20	°C
8	08 Aug 91	TSS	39.00	mg/L
8	08 Aug 91	TURB	16.00	JTU
8	13 Aug 91	TEMP	24.40	°C
8	20 Aug 91	TEMP	24.60	°C
8	27 Aug 91	TEMP	24.60	°C

Table B.2 (continued)

Month	Date	Analysis	Value	Units
9	04 Sep 91	TEMP	24.6	°C
9	05 Sep 91	COND	1.6	mS/cm
9	05 Sep 91	TDS	229.0	mg/L
9	05 Sep 91	TEMP	25.2	°C
9	05 Sep 91	TSS	16.0	mg/L
9	05 Sep 91	TURB	10.0	JTU
9	10 Sep 91	TEMP	25.4	°C
9	17 Sep 91	TEMP	26.5	°C
9	24 Sep 91	TEMP	19.2	°C
10	01 Oct 91	TEMP	18.0	°C
10	03 Oct 91	COND	1.4	mS/cm
10	03 Oct 91	TDS	209.0	mg/L
10	03 Oct 91	TEMP	19.4	°C
10	03 Oct 91	TSS	15.0	mg/L
10	03 Oct 91	TURB	18.0	JTU
10	08 Oct 91	TEMP	14.5	°C
10	15 Oct 91	TEMP	15.0	°C
10	22 Oct 91	TEMP	14.6	°C
10	29 Oct 91	TEMP	20.4	°C
11	05 Nov 91	TEMP	9.0	°C
11	07 Nov 91	COND	0.4	mS/cm
11	07 Nov 91	TDS	258.0	mg/L
11	07 Nov 91	TEMP	9.6	°C
11	07 Nov 91	TSS	8.0	mg/L
11	07 Nov 91	TURB	6.0	JTU
11	12 Nov 91	TEMP	8.8	°C
11	19 Nov 91	TEMP	13.8	°C
11	26 Nov 91	TEMP	6.2	°C

Table B.2 (continued)

Month	Date	Analysis	Value	Units
12	03 Dec 91	TEMP	13.9	°C
12	05 Dec 91	COND	0.2	mS/cm
12	05 Dec 91	TDS	151.0	mg/L
12	05 Dec 91	TEMP	7.7	°C
12	05 Dec 91	TSS	37.0	mg/L
12	05 Dec 91	TURB	10.0	NTU
12	10 Dec 91	TEMP	11.8	°C
12	17 Dec 91	TEMP	6.4	°C
12	27 Dec 91	TEMP	8.2	°C
12	31 Dec 91	TEMP	8.7	°C
1	07 Jan 92	TEMP	8.500	°C
1	09 Jan 92	COND	0.281	mS/cm
1	09 Jan 92	TDS	205.000	mg/L
1	09 Jan 92	TEMP	10.800	°C
1	09 Jan 92	TSS	10.000	mg/L
1	09 Jan 92	TURB	9.000	NTU
1	14 Jan 92	TEMP	8.500	°C
1	21 Jan 92	TEMP	4.300	°C
1	28 Jan 92	TEMP	8.800	°C
2	04 Feb 92	TEMP	7.60	°C
2	06 Feb 92	COND	0.55	mS/cm
2	06 Feb 92	TDS	221.00	mg/L
2	06 Feb 92	TEMP	7.70	°C
2	06 Feb 92	TSS	20.00	mg/L
2	06 Feb 92	TURB	20.00	NTU
2	11 Feb 92	TEMP	7.40	°C
2	18 Feb 92	TEMP	10.70	°C
2	25 Feb 92	TEMP	12.60	°C

Table B.2 (continued)

Month	Date	Analysis	Value	Units
3	03 Mar 92	TEMP	12.4	°C
3	05 Mar 92	COND	0.7	mS/cm
3	05 Mar 92	TDS	194.0	mg/L
3	05 Mar 92	TEMP	14.9	°C
3	05 Mar 92	TSS	15.0	mg/L
3	05 Mar 92	TURB	27.0	NTU
3	10 Mar 92	TEMP	16.5	°C
3	17 Mar 92	TEMP	11.1	°C
3	24 Mar 92	TEMP	10.4	°C
3	31 Mar 92	TEMP	11.1	°C
4	07 Apr 92	TEMP	12.9	°C
4	09 Apr 92	COND	0.2	mS/cm
4	09 Apr 92	TDS	279.0	mg/L
4	09 Apr 92	TEMP	15.5	°C
4	09 Apr 92	TSS	13.0	mg/L
4	09 Apr 92	TURB	18.0	NTU
4	14 Apr 92	TEMP	17.7	°C
4	21 Apr 92	TEMP	21.2	°C
4	28 Apr 92	TEMP	13.7	°C
5	05 May 92	TEMP	19.2	°C
5	07 May 92	COND	0.9	mS/cm
5	07 May 92	TDS	255.0	mg/L
5	07 May 92	TEMP	15.5	°C
5	07 May 92	TSS	39.0	mg/L
5	07 May 92	TURB	18.0	NTU
5	12 May 92	TEMP	22.8	°C
5	19 May 92	TEMP	26.2	°C
5	26 May 92	TEMP	21.4	°C

Table B.2 (continued)

Month	Date	Analysis	Value	Units
6	02 Jun 92	TEMP	20.00	°C
6	04 Jun 92	COND	0.16	mS/cm
6	04 Jun 92	TDS	279.00	mg/L
6	04 Jun 92	TEMP	20.80	°C
6	04 Jun 92	TSS	14.00	mg/L
6	04 Jun 92	TURB	18.00	NTU
6	09 Jun 92	TEMP	24.20	°C
6	16 Jun 92	TEMP	27.90	°C
6	23 Jun 92	TEMP	22.80	°C
6	29 Jun 92	TEMP	24.50	°C
7	07 Jul 92	TEMP	25.20	°C
7	09 Jul 92	COND	0.12	mS/cm
7	09 Jul 92	TDS	220.00	mg/L
7	09 Jul 92	TEMP	27.50	°C
7	09 Jul 92	TSS	7.00	mg/L
7	09 Jul 92	TURB	8.00	NTU
7	14 Jul 92	TEMP	27.40	°C
7	21 Jul 92	TEMP	27.10	°C
7	28 Jul 92	TEMP	25.50	°C

Appendix C

CONTINUOUS WATER QUALITY MONITORING RESULTS

Table C.1. Water quality monitoring results for the White Oak Creek mouth station (CRM 20.8).
Data are hourly average values.

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
04 Jun 91	0	20.9143	6.9929	4.7329
04 Jun 91	1	21.1243	7.1514	4.0329
04 Jun 91	2	21.0171	7.1357	3.8914
04 Jun 91	3	20.9050	7.0717	4.1200
04 Jun 91	4	20.8250	7.0600	4.2450
04 Jun 91	5	20.6333	7.0517	4.2533
04 Jun 91	6	20.5533	7.0567	4.2267
04 Jun 91	7	20.4667	7.0467	4.3917
04 Jun 91	8	20.3083	7.0400	4.4867
04 Jun 91	9	20.3067	7.0717	4.5867
04 Jun 91	10	20.3950	7.0450	4.2617
04 Jun 91	11	20.6017	7.0283	4.1183
04 Jun 91	12	20.8467	7.0300	4.1917
04 Jun 91	13	20.9333	7.0333	4.1333
04 Jun 91	14	20.2850	6.8375	4.9775
04 Jun 91	15	20.0117	6.6933	5.9033
04 Jun 91	16	19.2260	6.2680	7.4880
04 Jun 91	17	20.1240	6.5980	7.1120
04 Jun 91	18	20.5883	6.7700	6.6100
04 Jun 91	19	21.2783	6.8500	6.5050
04 Jun 91	20	21.1350	6.8200	6.2933
04 Jun 91	21	21.1529	5.9871	5.8857
04 Jun 91	22	21.0038	6.9100	5.1175
04 Jun 91	23	20.8463	6.8900	5.0363
13 Jun 91	0	19.5800	6.2400	7.3300
13 Jun 91	1	19.5400	6.2400	7.3900
13 Jun 91	2	19.5600	6.2250	7.2800
13 Jun 91	3	19.5650	6.2000	7.0850
13 Jun 91	4	19.5700	6.2300	7.3900
13 Jun 91	5	19.7400	6.3150	7.5400

C-4

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
13 Jun 91	6	19.7850	6.3000	7.4350
13 Jun 91	7	19.9100	6.2500	7.3000
13 Jun 91	8	19.3950	6.3200	7.6400
13 Jun 91	9	19.4000	6.4300	7.5050
13 Jun 91	10	19.4550	6.4700	7.4900
13 Jun 91	11	19.7850	6.4450	7.2450
13 Jun 91	12	20.2000	6.4200	7.2900
13 Jun 91	13	19.9867	6.4200	7.3367
13 Jun 91	14	20.1550	6.5300	7.5700
13 Jun 91	15	20.2000	6.3300	7.4600
13 Jun 91	16	20.2800	6.2800	7.4200
13 Jun 91	17	20.5300	6.2500	7.2250
13 Jun 91	18	20.4700	6.3700	7.2800
13 Jun 91	19	21.3000	6.1550	6.7750
13 Jun 91	20	20.0750	6.3650	7.2950
13 Jun 91	21	20.0000	6.3150	7.2350
13 Jun 91	22	19.9950	6.2900	7.1000
13 Jun 91	23	19.9950	6.3150	7.2350
14 Jun 91	0	20.0000	6.2700	6.9250
14 Jun 91	1	19.9850	6.2250	7.0500
14 Jun 91	2	19.9900	6.2150	6.8950
14 Jun 91	3	20.0000	6.2000	6.6900
14 Jun 91	4	19.9850	6.2000	6.8050
14 Jun 91	5	19.9800	6.2100	6.9600
14 Jun 91	6	19.9850	6.1850	6.7300
14 Jun 91	7	19.9800	6.2550	6.8450
14 Jun 91	8	19.9850	6.1750	6.7400
14 Jun 91	9	19.9900	6.1650	6.7400
14 Jun 91	10	19.9900	6.1650	6.5700
14 Jun 91	11	20.0050	6.1750	6.3600
14 Jun 91	12	19.9900	6.2050	6.5300
14 Jun 91	13	20.3100	6.3150	7.1100

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
14 Jun 91	14	20.6650	6.3850	7.4000
14 Jun 91	15	20.3150	6.2650	7.4600
14 Jun 91	16	20.1800	6.3450	7.3550
14 Jun 91	17	20.1700	6.2150	7.2100
14 Jun 91	18	20.1050	6.2450	7.1400
14 Jun 91	19	20.1300	6.3200	7.1900
14 Jun 91	20	19.8500	6.2950	7.0750
14 Jun 91	21	19.7700	6.2400	7.0250
14 Jun 91	22	19.7300	6.2650	6.8450
14 Jun 91	23	19.7300	6.1700	6.8700
15 Jun 91	0	19.7125	6.2000	6.4200
15 Jun 91	1	19.7050	6.1000	6.3475
15 Jun 91	2	19.6900	6.1650	6.3950
15 Jun 91	3	19.7067	6.2033	6.2800
15 Jun 91	4	19.7025	6.1275	6.2475
15 Jun 91	5	19.6950	6.1800	6.2000
15 Jun 91	7	19.7000	6.1080	6.0620
15 Jun 91	8	19.6900	6.1475	6.1800
15 Jun 91	9	19.6925	6.1450	6.1900
15 Jun 91	10	19.7025	6.1525	6.3900
15 Jun 91	11	19.7175	6.1650	6.6100
15 Jun 91	12	19.7350	6.1900	6.4475
15 Jun 91	13	19.7500	6.1650	6.2900
15 Jun 91	14	20.1175	6.2475	7.0325
15 Jun 91	15	20.2875	6.2600	6.9200
15 Jun 91	16	20.2150	6.3100	6.9825
15 Jun 91	17	20.0760	6.2820	7.0640
15 Jun 91	18	20.7550	6.3075	6.9500
15 Jun 91	19	20.8025	6.2825	6.7625
15 Jun 91	20	19.8400	6.2150	6.6500
15 Jun 91	21	19.7825	6.2150	6.5325
15 Jun 91	22	19.7900	6.1700	6.3100

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
15 Jun 91	23	19.8100	6.1500	6.3175
16 Jun 91	0			
17 Jun 91	0	19.8700	6.1200	5.9450
17 Jun 91	1	19.8550	6.1250	5.9450
17 Jun 91	2	19.8550	6.1100	5.7900
17 Jun 91	3	19.8550	6.1250	5.5350
17 Jun 91	4	19.8050	6.2000	6.3000
17 Jun 91	5	19.8250	6.1900	6.1650
17 Jun 91	6	19.8450	6.2150	6.4000
17 Jun 91	7	19.8600	6.1950	6.2300
17 Jun 91	8	19.8100	6.1600	5.9650
17 Jun 91	9	19.8150	6.1400	6.2050
17 Jun 91	10	19.8450	6.1200	5.9250
17 Jun 91	11	19.8600	6.0650	5.8900
17 Jun 91	12	19.8650	6.0650	5.8400
17 Jun 91	13	20.1050	6.2200	6.3750
17 Jun 91	14	20.2900	6.2300	6.7200
17 Jun 91	15	20.2900	6.1700	6.7450
17 Jun 91	16	20.5150	6.2050	6.6550
17 Jun 91	17	20.6200	6.1950	6.5200
17 Jun 91	18	20.4950	6.1800	6.3350
17 Jun 91	19	22.1550	6.4050	7.4050
17 Jun 91	20	20.3000	6.1200	6.2100
17 Jun 91	21	20.2800	6.0900	6.0650
17 Jun 91	22	20.2700	5.9900	5.8800
17 Jun 91	23	20.2450	6.0650	5.8500
18 Jun 91	0	20.2450	6.0550	5.4950
18 Jun 91	1	20.2400	6.0350	5.3450
18 Jun 91	2	20.2500	5.9950	5.2400
18 Jun 91	3	20.2400	6.0700	5.7400
18 Jun 91	4	20.2500	6.0000	5.3550
18 Jun 91	5	20.2400	6.0550	5.6500

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
18 Jun 91	6	20.2400	6.0500	5.5100
18 Jun 91	7	20.2250	6.0650	5.7300
18 Jun 91	8	20.2500	6.0700	5.8000
18 Jun 91	9	20.2550	6.0350	5.4950
18 Jun 91	10	20.2500	6.0150	5.3900
18 Jun 91	11	20.2750	6.0400	5.3950
18 Jun 91	12	20.3000	6.0550	5.9050
18 Jun 91	13	20.6000	6.2250	6.4250
18 Jun 91	14	20.9000	6.2200	6.5100
18 Jun 91	15	20.7600	6.2200	6.6200
18 Jun 91	16	20.7300	6.1950	6.7400
18 Jun 91	17	20.6450	6.2400	6.7350
18 Jun 91	18	20.5300	6.2000	6.7600
18 Jun 91	19	20.5950	6.2400	6.9400
18 Jun 91	20	20.6250	6.3100	6.8400
18 Jun 91	21	20.5200	6.2400	6.6500
18 Jun 91	22	20.2600	6.1800	6.4150
18 Jun 91	23	20.2350	6.1650	6.2950
19 Jun 91	0	20.3275	6.2350	6.5175
19 Jun 91	1	20.3600	6.2667	6.5967
19 Jun 91	2	20.3175	6.2400	6.5350
19 Jun 91	3	20.3125	6.2125	6.5175
19 Jun 91	4	20.3075	6.2325	6.5250
19 Jun 91	5	20.3200	6.2340	6.5140
19 Jun 91	7	20.2900	6.2100	6.3675
19 Jun 91	8	20.2925	6.2500	6.3175
19 Jun 91	9	20.2975	6.1800	6.2175
19 Jun 91	10	20.2950	6.1675	6.3075
19 Jun 91	11	20.3050	6.1400	6.3050
19 Jun 91	12	20.4375	6.1675	6.5025
19 Jun 91	13	20.4850	6.1850	6.5050
19 Jun 91	14	20.6100	6.2375	6.9625

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
19 Jun 91	15	20.7040	6.2800	6.9400
19 Jun 91	16	20.7025	6.3025	6.9850
19 Jun 91	17	21.0100	6.3850	7.1050
19 Jun 91	18	21.0375	6.3525	7.1200
19 Jun 91	19	20.9925	6.3725	7.2025
19 Jun 91	20	21.6125	6.5350	7.7875
19 Jun 91	21	21.5050	6.5025	7.7900
19 Jun 91	22	20.6400	6.2550	7.0075
19 Jun 91	23	20.6350	6.2550	6.9050
20 Jun 91	0			
21 Jun 91	0	21.0100	6.5150	7.5275
21 Jun 91	1	21.0400	6.5360	7.5620
21 Jun 91	2	20.9800	6.5175	7.4600
21 Jun 91	3	20.9775	6.5000	7.3825
21 Jun 91	4	20.9800	6.4725	7.4450
21 Jun 91	5	20.9775	6.5000	7.4200
21 Jun 91	6	20.9675	6.4675	7.3200
21 Jun 91	7	20.9600	6.4525	7.2200
21 Jun 91	8	20.9625	6.4675	7.2300
21 Jun 91	9	20.9625	6.4775	7.3400
21 Jun 91	10	20.9550	6.4600	7.2700
21 Jun 91	11	20.9200	6.4800	7.1850
21 Jun 91	12	20.9150	6.4925	7.2200
21 Jun 91	13	20.9200	6.5275	7.2250
21 Jun 91	14	21.2025	6.5600	7.6375
21 Jun 91	15	21.1650	6.5950	7.7125
21 Jun 91	16	20.7120	6.6280	7.9400
21 Jun 91	17	20.4875	6.6250	7.6325
21 Jun 91	18	20.4075	6.6250	7.4275
21 Jun 91	19	21.5075	6.8150	8.6075
21 Jun 91	20	20.8800	6.6950	7.7050
21 Jun 91	21	20.7600	6.6800	7.5800

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
21 Jun 91	22	20.7450	6.6925	7.5450
21 Jun 91	23	20.7425	6.7025	7.5225
22 Jun 91	0			
23 Jun 91	0	20.3625	6.6300	6.8850
23 Jun 91	1	20.3425	6.6350	6.8825
23 Jun 91	2	20.3275	6.6400	6.8625
23 Jun 91	3	20.3325	6.6300	6.8200
23 Jun 91	4	20.3300	6.6375	6.8000
23 Jun 91	5	20.3500	6.6300	6.7600
23 Jun 91	6	20.3175	6.6225	6.7325
23 Jun 91	7	20.3200	6.6275	6.7425
23 Jun 91	8	20.3225	6.6350	6.7625
23 Jun 91	9	20.3400	6.6250	6.7425
23 Jun 91	10	20.3400	6.6080	6.7100
23 Jun 91	11	20.4150	6.6425	6.8575
23 Jun 91	12	20.3400	6.6375	6.7875
23 Jun 91	13	20.7800	6.7000	7.5750
23 Jun 91	14	21.0250	6.7450	7.6250
23 Jun 91	15	20.5000	6.6450	7.2050
23 Jun 91	16	20.7350	6.6800	7.3150
23 Jun 91	17	20.6750	6.6650	7.0850
23 Jun 91	18	20.5850	6.6600	7.0450
23 Jun 91	19	20.7250	6.7050	7.2500
23 Jun 91	20	21.4567	6.8467	7.7600
23 Jun 91	21	20.4550	6.6450	6.9700
23 Jun 91	22	20.4450	6.6300	6.9300
23 Jun 91	23	20.3800	6.6600	6.8800
24 Jun 91	13	20.8100	6.6900	7.3500
24 Jun 91	14	20.7550	6.6700	7.1250
24 Jun 91	15	20.5750	6.6600	7.1250
24 Jun 91	16	20.5800	6.6950	7.1450
24 Jun 91	17	20.8700	6.7500	7.1600

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
24 Jun 91	18	20.7550	6.7200	7.0550
24 Jun 91	19	20.7500	6.7300	7.0550
24 Jun 91	20	20.8200	6.7350	7.1150
24 Jun 91	21	21.5500	6.7700	7.5600
24 Jun 91	22	20.7750	6.7250	7.1100
24 Jun 91	23	20.7600	6.7150	7.0700
25 Jun 91	0	20.6700	6.7000	6.9750
25 Jun 91	1	20.6550	6.7000	6.9650
25 Jun 91	2	20.6850	6.6900	6.8750
25 Jun 91	3	20.6500	6.6650	6.8850
25 Jun 91	4	20.6750	6.6700	6.9000
25 Jun 91	5	20.6850	6.6900	6.8950
25 Jun 91	6	20.6800	6.6950	6.8500
25 Jun 91	7	20.6500	6.6700	6.8350
25 Jun 91	8	20.9100	6.6650	6.9350
25 Jun 91	9	21.0467	6.6100	6.8200
25 Jun 91	10	21.0750	6.5550	6.5900
25 Jun 91	11	21.2600	6.5000	6.6300
25 Jun 91	12	21.6350	6.4500	6.5850
25 Jun 91	13	20.5450	6.5950	6.5700
25 Jun 91	14	20.6950	6.6700	6.9300
25 Jun 91	15	21.1450	6.7200	7.0600
25 Jun 91	16	21.1150	6.6300	6.7250
25 Jun 91	17	21.4800	6.5550	6.7500
25 Jun 91	18	21.7650	6.5600	6.6150
25 Jun 91	19	21.7350	6.6550	6.9750
25 Jun 91	20	21.8400	6.5900	6.7950
25 Jun 91	21	21.8250	6.5400	6.8250
25 Jun 91	22	21.7150	6.3200	6.5000
25 Jun 91	23	21.5200	6.3550	6.7300
26 Jun 91	0	21.1575	6.4025	7.0300
26 Jun 91	1	20.6050	6.2600	7.0275

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
26 Jun 91	2	20.7600	6.3050	7.0950
26 Jun 91	3	20.5650	6.2550	7.0450
26 Jun 91	4	20.3750	6.2450	7.2200
26 Jun 91	5	20.2300	6.2850	7.4950
26 Jun 91	6	20.1700	6.2900	7.5050
26 Jun 91	7	20.1500	6.2800	7.4100
26 Jun 91	8	20.1200	6.2650	7.3200
26 Jun 91	9	22.0950	6.7450	7.1100
26 Jun 91	10	21.7250	6.6500	7.0750
26 Jun 91	11	20.4750	6.3150	7.1950
26 Jun 91	12	20.1850	6.2550	7.2200
26 Jun 91	13	20.5400	6.3800	7.0800
26 Jun 91	14	20.3900	6.3150	7.0900
26 Jun 91	15	20.3800	6.3300	7.1150
26 Jun 91	16	20.4033	6.2567	7.0433
26 Jun 91	17	20.7600	6.4850	6.8450
26 Jun 91	18	21.0450	6.6550	6.8650
26 Jun 91	19	21.4300	6.7200	7.0100
26 Jun 91	20	20.5100	6.2300	6.9350
26 Jun 91	21	20.5350	6.2400	7.0100
26 Jun 91	22	20.7400	6.3550	7.1150
26 Jun 91	23	21.0950	6.4950	7.0850
27 Jun 91	1	20.5900	6.2800	6.9900
27 Jun 91	3	20.2050	6.2650	7.1000
27 Jun 91	4	20.1300	6.2600	7.0900
27 Jun 91	5	20.1700	6.2850	7.0500
27 Jun 91	6	20.9750	6.4650	6.9600
27 Jun 91	7	21.5900	6.6550	6.7200
27 Jun 91	8	21.2300	6.6150	6.5800
27 Jun 91	9	21.1700	6.5750	6.6300
27 Jun 91	10	20.6550	6.4450	6.7850
27 Jun 91	11	20.1850	6.3400	6.9650

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
27 Jun 91	12	20.1500	6.3850	6.9700
27 Jun 91	13	20.6500	6.5350	6.6350
27 Jun 91	14	20.8900	6.6100	6.8300
27 Jun 91	15	21.1950	6.6550	7.0250
27 Jun 91	16	21.2650	6.6600	7.1250
27 Jun 91	17	21.2100	6.6600	7.1700
27 Jun 91	18	21.3100	6.5400	7.2500
27 Jun 91	19	21.3250	6.3900	7.2900
27 Jun 91	20	21.3050	6.4450	7.3750
27 Jun 91	21	21.2050	6.3850	7.3700
27 Jun 91	22	21.3150	6.6650	7.4050
27 Jun 91	23	21.3950	6.7050	7.4100
28 Jun 91	0	21.3050	6.5200	7.2500
28 Jun 91	1	21.1150	6.3350	7.0950
28 Jun 91	2	21.0950	6.3400	7.1000
28 Jun 91	3	21.0400	6.3400	7.0000
28 Jun 91	4	21.1100	6.3900	7.0350
28 Jun 91	5	21.1600	6.4450	7.0300
28 Jun 91	6	21.1100	6.4000	6.9750
28 Jun 91	7	21.1150	6.3850	6.9000
28 Jun 91	8	21.0500	6.3450	6.7800
28 Jun 91	9	21.0250	6.3200	6.7350
28 Jun 91	10	21.0400	6.3250	6.7300
28 Jun 91	11	21.5300	6.5850	7.2600
28 Jun 91	12	21.4800	6.5050	7.1250
28 Jun 91	13	21.5250	6.6200	7.3350
28 Jun 91	14	21.5850	6.6200	7.3250
28 Jun 91	15	20.6300	6.5000	7.2200
28 Jun 91	17	20.6500	6.2350	7.4300
28 Jun 91	18	20.4300	6.2300	7.4900
28 Jun 91	19	20.3700	6.2400	7.5100
28 Jun 91	20	21.4800	6.3500	7.5350

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
28 Jun 91	21	20.0650	6.3550	7.4650
28 Jun 91	22	20.0300	6.3450	7.3900
28 Jun 91	23	19.9950	6.3750	7.2900
29 Jun 91	0	19.9950	6.3800	7.1950
29 Jun 91	1	20.0000	6.3850	7.1850
29 Jun 91	2	19.9950	6.3750	7.1250
29 Jun 91	3	19.9900	6.3600	7.0600
29 Jun 91	4	19.9900	6.3650	6.9950
29 Jun 91	5	19.9900	6.3800	6.9700
29 Jun 91	6	19.9850	6.3100	6.9350
29 Jun 91	7	19.9800	6.3750	6.9500
29 Jun 91	8	19.9800	6.3500	6.9750
29 Jun 91	9	19.9850	6.2400	6.9350
29 Jun 91	10	19.9950	6.3700	7.1600
29 Jun 91	11	20.0250	6.3650	7.0200
29 Jun 91	12	20.0050	6.3650	6.9900
29 Jun 91	13	20.0150	6.3750	7.0600
29 Jun 91	14	20.0500	6.3850	7.1150
29 Jun 91	15	20.7550	6.3900	7.3450
29 Jun 91	16	20.3900	6.3950	7.3650
29 Jun 91	17	19.2800	6.3850	7.5550
29 Jun 91	18	19.2250	6.4150	7.5750
29 Jun 91	19	20.0600	6.4450	7.4950
29 Jun 91	20	20.7150	6.5000	7.5900
29 Jun 91	21	19.5650	6.5050	7.8100
29 Jun 91	22	19.5700	6.4800	7.7150
29 Jun 91	23	19.5400	6.4700	7.6900
30 Jun 91	0	19.0638	6.4900	7.8313
30 Jun 91	1	19.0450	6.4788	7.7900
30 Jun 91	2	19.0125	6.4738	7.7700
30 Jun 91	3	18.9963	6.4538	7.7063
30 Jun 91	4	19.0038	6.4488	7.6825

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
30 Jun 91	5	18.9744	6.4444	7.6278
30 Jun 91	6	18.9978	6.4400	7.6611
30 Jun 91	7	19.0150	6.4288	7.5875
30 Jun 91	8	18.9963	6.4463	7.5875
30 Jun 91	9	18.9744	6.3811	7.5722
30 Jun 91	10	18.9938	6.3800	7.6013
30 Jun 91	11	19.1688	6.3850	7.6513
30 Jun 91	12	19.1550	6.3588	7.8800
30 Jun 91	13	19.2288	6.3975	7.9375
30 Jun 91	14	19.2925	6.4313	7.9250
30 Jun 91	15	19.1633	6.4122	7.8900
30 Jun 91	16	18.8090	6.4400	8.0350
30 Jun 91	17	18.7263	6.4588	8.1363
30 Jun 91	18	19.2300	6.4700	8.0738
30 Jun 91	19	20.1450	6.5250	8.0275
30 Jun 91	20	20.7363	6.5200	7.8588
30 Jun 91	21	18.9538	6.4900	8.1275
30 Jun 91	22	18.7450	6.4888	8.1163
30 Jun 91	23	18.7500	6.4838	8.0613
04 Jul 91	0	18.4975	6.4875	8.4100
04 Jul 91	1	18.4975	6.5025	8.3675
04 Jul 91	2	18.4875	6.5050	8.3100
04 Jul 91	3	18.4600	6.5000	8.3225
04 Jul 91	4	18.4450	6.4925	8.2975
04 Jul 91	5	18.4600	6.4950	8.2875
04 Jul 91	6	18.4600	6.5000	8.2775
04 Jul 91	7	18.4625	6.4900	8.2525
04 Jul 91	8	18.4650	6.5025	8.2050
04 Jul 91	9	18.5275	6.4750	8.1750
04 Jul 91	10	18.6000	6.4620	8.1320
04 Jul 91	11	18.5200	6.4725	8.2475

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
04 Jul 91	12	18.6650	6.4575	8.2950
04 Jul 91	13	18.5900	6.4500	8.4025
04 Jul 91	14	18.6750	6.4775	8.4825
04 Jul 91	15	18.5625	6.4825	8.4850
04 Jul 91	16	18.7125	6.5225	8.6050
04 Jul 91	17	18.8575	6.5625	8.7600
04 Jul 91	18	19.0150	6.5875	8.8850
04 Jul 91	19	20.1100	6.5550	8.4850
04 Jul 91	20	21.0667	6.5667	8.4400
04 Jul 91	21	19.2650	6.5700	8.6250
04 Jul 91	22	19.3900	6.4650	8.4100
04 Jul 91	23	18.5333	6.5100	8.4267
05 Jul 91	20	19.1700	6.6200	9.0900
05 Jul 91	21	19.2000	6.6350	9.1300
05 Jul 91	22	19.1900	6.6200	9.1000
05 Jul 91	23	19.2200	6.6350	9.0700
06 Jul 91	0	19.2450	6.6200	8.9900
06 Jul 91	1	19.2150	6.6000	8.9650
06 Jul 91	2	19.1900	6.6100	8.9850
06 Jul 91	3	19.2050	6.6250	9.0100
06 Jul 91	4	19.2200	6.6250	8.9900
06 Jul 91	5	19.2300	6.6050	8.8950
06 Jul 91	6	19.2200	6.5900	8.8550
06 Jul 91	7	19.2150	6.5950	8.8300
06 Jul 91	8	19.2200	6.5750	8.8400
06 Jul 91	9	19.2050	6.6050	8.8750
06 Jul 91	10	19.2200	6.6100	8.9750
06 Jul 91	11	19.2250	6.6300	9.0000
06 Jul 91	12	19.3600	6.5850	8.9350
06 Jul 91	13	19.7150	6.5800	8.8600
06 Jul 91	14	19.4600	6.5450	8.9300
06 Jul 91	15	19.1900	6.5050	8.7900

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
06 Jul 91	16	18.5950	6.4650	8.6200
06 Jul 91	17	18.7700	6.5050	8.8050
06 Jul 91	18	19.2100	6.6000	9.0300
06 Jul 91	19	20.1250	6.6250	8.9600
06 Jul 91	20	19.6200	6.6050	8.9850
06 Jul 91	21	19.1650	6.5500	8.8550
06 Jul 91	22	19.0600	6.5200	8.6750
06 Jul 91	23	18.8550	6.4950	8.6600
07 Jul 91	0	18.9300	6.5200	8.5725
07 Jul 91	1	18.9375	6.5300	8.5550
07 Jul 91	2	18.9475	6.5325	8.5125
07 Jul 91	3	18.9150	6.5150	8.4575
07 Jul 91	4	18.9360	6.5100	8.4440
07 Jul 91	5	18.9100	6.5025	8.4300
07 Jul 91	6	18.9250	6.5150	8.3975
07 Jul 91	7	18.7700	6.4900	8.4400
07 Jul 91	8	18.7700	6.5000	8.4250
07 Jul 91	9	18.7950	6.4950	8.4150
07 Jul 91	10	18.8200	6.5050	8.4150
07 Jul 91	11	18.7900	6.5050	8.4050
07 Jul 91	12	18.8250	6.5350	8.6750
07 Jul 91	13	18.8650	6.5700	8.7200
07 Jul 91	14	18.9300	6.5900	8.8300
07 Jul 91	15	19.6300	6.5150	8.7700
07 Jul 91	16	19.1500	6.5100	8.7700
07 Jul 91	17	19.1750	6.5600	8.7200
07 Jul 91	18	19.6700	6.5900	8.8300
07 Jul 91	19	19.5500	6.6000	8.8850
07 Jul 91	20	19.7250	6.6000	8.8200
07 Jul 91	21	21.9750	6.6800	8.4900
07 Jul 91	22	19.2000	6.5350	8.4800
07 Jul 91	23	19.0950	6.5250	8.5100

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
08 Jul 91	7	19.1000	6.5100	8.2500
08 Jul 91	8	19.0500	6.5050	8.2750
08 Jul 91	9	19.0400	6.5050	8.3200
08 Jul 91	10	19.0650	6.5450	8.3900
08 Jul 91	11	19.2000	6.5000	8.4100
08 Jul 91	12	19.2800	6.5150	8.3750
08 Jul 91	13	19.1250	6.4800	8.3650
08 Jul 91	14	19.0150	6.4800	8.3450
08 Jul 91	15	18.6650	6.4300	8.2500
08 Jul 91	16	18.8150	6.5000	8.3900
08 Jul 91	17	19.0700	6.5400	8.4900
08 Jul 91	18	19.2250	6.5600	8.4900
08 Jul 91	19	19.4650	6.5800	8.4750
08 Jul 91	20	19.5700	6.6200	8.4700
08 Jul 91	21	19.3600	6.5300	8.4600
08 Jul 91	22	19.9600	6.6500	8.5200
08 Jul 91	23	19.3600	6.5700	8.5000
09 Jul 91	0	19.6280	6.6520	8.4900
09 Jul 91	1	19.5683	6.6300	8.4650
09 Jul 91	2	19.6200	6.6280	8.4380
09 Jul 91	3	19.6350	6.6200	8.4050
09 Jul 91	4	19.6540	6.6160	8.4000
09 Jul 91	5	19.5950	6.6075	8.3525
09 Jul 91	6	19.5850	6.5875	8.2775
09 Jul 91	7	19.6600	6.6167	8.3000
09 Jul 91	8	19.8400	6.6300	8.3350
09 Jul 91	9	19.8400	6.6500	8.4000
09 Jul 91	10	19.8500	6.6400	8.3550
09 Jul 91	11	19.8850	6.6500	8.3950
09 Jul 91	12	19.4125	6.5600	8.2675
09 Jul 91	13	19.6475	6.5675	8.3325
09 Jul 91	14	19.2075	6.5250	8.2150

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
09 Jul 91	15	19.3900	6.5800	8.2775
09 Jul 91	16	19.5483	6.6033	8.3883
09 Jul 91	17	19.6975	6.6450	8.5075
09 Jul 91	18	19.8975	6.6850	8.6050
09 Jul 91	19	19.6625	6.6600	8.5350
09 Jul 91	20	19.9575	6.7000	8.5750
09 Jul 91	21	21.9225	6.7875	8.6000
09 Jul 91	22	20.8025	6.7150	8.6600
09 Jul 91	23	19.6875	6.6675	8.5225
10 Jul 91	0			
11 Jul 91	0	19.2800	6.5850	8.1600
11 Jul 91	1	19.2650	6.5900	8.1250
11 Jul 91	2	19.3567	6.5833	8.1633
11 Jul 91	3	19.3750	6.6075	8.1975
11 Jul 91	4	19.3500	6.5940	8.1340
11 Jul 91	5	19.3725	6.5875	8.1450
11 Jul 91	6	19.3675	6.5700	8.1000
11 Jul 91	7	19.3650	6.6050	8.1300
11 Jul 91	8	19.3700	6.6050	8.1275
11 Jul 91	9	19.3700	6.5975	8.1100
11 Jul 91	10	19.3825	6.5800	8.1150
11 Jul 91	11	19.5050	6.6275	8.2500
11 Jul 91	12	19.5275	6.5825	8.2075
11 Jul 91	13	19.2625	6.5600	8.1675
11 Jul 91	14	19.0325	6.5425	8.0725
11 Jul 91	15	19.2225	6.5825	8.1250
11 Jul 91	16	19.2460	6.5820	8.1440
11 Jul 91	17	19.3750	6.6050	8.2325
11 Jul 91	18	19.3200	6.6075	8.2325
11 Jul 91	19	19.4525	6.6225	8.2275
11 Jul 91	20	19.7625	6.6225	8.2725
11 Jul 91	21	19.6975	6.6500	8.1475

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
11 Jul 91	22	20.5625	6.6575	8.0375
11 Jul 91	23	18.8700	6.5550	8.0725
12 Jul 91	0			
13 Jul 91	0	18.5000	6.5125	7.9075
13 Jul 91	1	18.5375	6.5125	7.8875
13 Jul 91	2	18.5525	6.5050	7.8425
13 Jul 91	3	18.4700	6.4975	7.8000
13 Jul 91	4	18.4800	6.5050	7.8075
13 Jul 91	5	18.4700	6.5000	7.7675
13 Jul 91	6	18.4850	6.5000	7.7325
13 Jul 91	7	18.4975	6.4950	7.7275
13 Jul 91	8	18.4625	6.5025	7.7225
13 Jul 91	9	18.4880	6.5060	7.7720
13 Jul 91	10	18.5300	6.5175	7.8050
13 Jul 91	11	18.5400	6.5200	7.8075
13 Jul 91	12	18.7525	6.5175	7.8200
13 Jul 91	13	18.7400	6.5150	7.8375
13 Jul 91	14	18.8775	6.5225	7.9500
13 Jul 91	15	19.1375	6.5275	7.8575
13 Jul 91	16	18.8600	6.5200	7.8900
13 Jul 91	17	18.7325	6.5400	7.8725
13 Jul 91	18	18.8275	6.5525	7.9450
13 Jul 91	19	19.1825	6.5700	8.0600
13 Jul 91	20	19.1450	6.5975	8.0475
13 Jul 91	21	19.7220	6.6380	8.1220
13 Jul 91	22	19.7150	6.5800	7.8650
13 Jul 91	23	18.2975	6.5050	7.8325
14 Jul 91	0			
15 Jul 91	0	18.0350	6.4950	7.7350
15 Jul 91	1	18.0500	6.4750	7.7050
15 Jul 91	2	18.0650	6.4850	7.6800
15 Jul 91	3	18.0300	6.4800	7.6250

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
15 Jul 91	4	18.0300	6.4700	7.5950
15 Jul 91	5	18.0250	6.4850	7.6450
15 Jul 91	6	18.0300	6.4900	7.6100
15 Jul 91	7	18.0250	6.4750	7.6000
15 Jul 91	8	18.0350	6.4750	7.5350
15 Jul 91	9	18.0300	6.4500	7.5100
15 Jul 91	10	18.0400	6.4800	7.5800
15 Jul 91	11	18.3150	6.4850	7.6800
15 Jul 91	12	18.9500	6.5000	8.1100
15 Jul 91	13	18.9300	6.5350	7.8150
15 Jul 91	14	18.9350	6.5400	7.5800
15 Jul 91	15	19.3550	6.6200	7.6300
15 Jul 91	16	19.4950	6.6550	7.6100
15 Jul 91	17	19.7600	6.6900	7.6850
15 Jul 91	18	19.7900	6.7050	7.6700
15 Jul 91	19	20.1300	6.7500	7.7000
15 Jul 91	21	20.5250	6.7900	7.7450
15 Jul 91	22	19.4600	6.6850	7.5600
15 Jul 91	23	19.4400	6.6750	7.5400
16 Jul 91	0	19.4550	6.6750	7.5350
16 Jul 91	1	19.4800	6.6750	7.5200
16 Jul 91	2	19.4550	6.6650	7.4350
16 Jul 91	3	19.4300	6.6650	7.4200
16 Jul 91	4	19.4067	6.6067	7.3767
16 Jul 91	5	19.4050	6.5200	7.3200
16 Jul 91	6	19.3900	6.6000	7.2850
16 Jul 91	7	19.3950	6.6350	7.2050
16 Jul 91	8	19.2950	6.6200	7.1100
16 Jul 91	9	19.3400	6.5200	7.1200
16 Jul 91	10	19.3650	6.6150	7.2050
16 Jul 91	11	19.6100	6.5950	7.2700
16 Jul 91	12	19.2750	6.5700	7.1750

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
16 Jul 91	13	18.9100	6.5600	7.1200
17 Jul 91	16	19.1650	6.6050	6.8750
17 Jul 91	17	19.4650	6.6750	7.0900
17 Jul 91	18	19.2400	6.6500	6.9850
17 Jul 91	19	19.3850	6.7000	7.0950
17 Jul 91	20	19.3850	6.6900	7.1250
17 Jul 91	21	20.4650	6.8500	7.5450
17 Jul 91	22	21.1350	6.8700	7.5450
17 Jul 91	23	19.2300	6.6500	6.9600
18 Jul 91	0			
20 Jul 91	0	18.9440	6.5880	6.7400
20 Jul 91	1	19.0150	6.5925	6.7600
20 Jul 91	2	19.0100	6.5825	6.7150
20 Jul 91	3	18.9900	6.5575	6.6950
20 Jul 91	4	18.9875	6.5400	6.6800
20 Jul 91	5	18.9925	6.5100	6.6275
20 Jul 91	6	18.9875	6.5400	6.6175
20 Jul 91	7	18.9875	6.4725	6.6350
20 Jul 91	8	18.9775	6.5100	6.5650
20 Jul 91	9	19.0025	6.5625	6.5925
20 Jul 91	10	19.0400	6.4950	6.6275
20 Jul 91	11	19.0825	6.4975	6.7650
20 Jul 91	12	19.3000	6.5625	6.8175
20 Jul 91	13	19.2560	6.5480	6.8180
20 Jul 91	14	19.2750	6.5175	6.8225
20 Jul 91	15	19.0750	6.5300	6.7525
20 Jul 91	16	18.9550	6.4925	6.6875
20 Jul 91	17	19.0125	6.5175	6.7175
20 Jul 91	18	19.4375	6.6175	7.0100
20 Jul 91	19	19.7775	6.6800	7.1625
20 Jul 91	20	19.8500	6.6900	7.1325
20 Jul 91	21	19.4350	6.6600	6.9150

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
20 Jul 91	22	18.8825	6.5650	6.7375
20 Jul 91	23	18.8800	6.5575	6.6950
21 Jul 91	0			
22 Jul 91	0	18.8625	6.5725	6.7575
22 Jul 91	1	18.9275	6.6000	6.7550
22 Jul 91	2	18.8975	6.5875	6.7025
22 Jul 91	3	18.8750	6.5850	6.6700
22 Jul 91	4	18.8840	6.5940	6.6800
22 Jul 91	5	18.8725	6.5775	6.6375
22 Jul 91	6	18.8675	6.5700	6.6300
22 Jul 91	7	18.8550	6.5625	6.6200
22 Jul 91	8	18.8850	6.5800	6.6000
22 Jul 91	9	18.9000	6.5350	6.6600
22 Jul 91	10	18.9825	6.5025	6.6850
22 Jul 91	11	18.6900	6.3950	6.7250
22 Jul 91	12	19.0125	6.4500	6.8075
22 Jul 91	13	19.0750	6.5650	6.7875
22 Jul 91	14	18.9600	6.5650	6.7225
22 Jul 91	15	19.1175	6.5900	6.8275
22 Jul 91	16	19.1420	5.8780	7.5280
22 Jul 91	17	19.3200	5.7700	7.8325
22 Jul 91	18	19.2575	5.7875	7.8675
22 Jul 91	19	19.7900	5.8700	8.2625
22 Jul 91	20	19.9825	5.9275	8.3350
22 Jul 91	21	20.2475	5.9850	8.4925
22 Jul 91	22	18.9075	5.7375	7.7375
22 Jul 91	23	18.8250	5.7425	7.6825
23 Jul 91	0			
24 Jul 91	0	18.7600	4.8250	8.2500
24 Jul 91	1	18.7750	4.8225	8.2450
24 Jul 91	2	18.8225	4.8350	8.2100
24 Jul 91	3	18.8325	4.8150	8.1650

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
24 Jul 91	4	18.8200	4.8050	8.1250
24 Jul 91	5	18.7900	4.8025	8.0600
24 Jul 91	6	18.7675	4.7950	8.0550
24 Jul 91	7	18.7400	4.7925	8.0575
24 Jul 91	8	18.7550	4.8075	8.0950
24 Jul 91	9	18.7800	4.8060	8.0620
24 Jul 91	10	18.8000	4.7875	8.0900
24 Jul 91	11	18.5625	4.7700	8.0225
24 Jul 91	12	18.7900	4.7950	8.1625
24 Jul 91	13	18.8300	4.8150	8.1775
24 Jul 91	14	18.6900	4.7975	8.1550
24 Jul 91	15	18.7200	4.8100	8.1575
24 Jul 91	16	18.7325	4.8350	8.2000
24 Jul 91	17	18.9900	4.8550	8.2875
24 Jul 91	18	19.0050	4.8550	8.2650
24 Jul 91	19	19.2325	4.8975	8.2475
24 Jul 91	20	19.1225	4.8675	8.1900
24 Jul 91	21	19.5700	4.8980	8.2180
24 Jul 91	22	19.4350	4.9050	8.0600
24 Jul 91	23	19.8650	4.8950	7.9100
25 Jul 91	0			
26 Jul 91	0	18.7167	5.9533	7.2000
26 Jul 91	1	18.6000	5.9483	7.2183
26 Jul 91	2	18.6000	5.9500	7.1983
26 Jul 91	3	18.5717	5.9383	7.1600
26 Jul 91	4	18.5467	5.9350	7.1283
26 Jul 91	5	18.6400	5.9350	7.0467
26 Jul 91	6	18.5900	5.9267	7.0367
26 Jul 91	7	18.5617	5.9300	7.0550
26 Jul 91	8	18.5133	5.9250	7.0450
26 Jul 91	9	18.5417	5.9300	7.0567
26 Jul 91	10	18.5600	5.9300	7.0600

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
26 Jul 91	11	18.6483	5.8950	7.1050
26 Jul 91	12	18.7150	5.8850	7.1000
26 Jul 91	13	18.5829	5.9643	7.0857
26 Jul 91	14	18.6725	6.4250	6.7925
26 Jul 91	15	18.5400	6.4317	7.0550
26 Jul 91	16	18.6217	6.5050	6.9717
26 Jul 91	17	18.6150	6.4700	6.9367
26 Jul 91	18	18.8100	6.4800	6.9733
26 Jul 91	19	18.7950	6.5033	6.9683
26 Jul 91	20	18.6367	6.5217	6.8883
26 Jul 91	21	18.5167	6.5283	6.8483
26 Jul 91	22	18.6000	6.5300	6.8150
26 Jul 91	23	19.5033	6.6000	6.9083
27 Jul 91	0			
29 Jul 91	0	17.4233	6.4567	6.3200
29 Jul 91	1	17.4850	6.4525	6.3775
29 Jul 91	2	17.5075	6.4525	6.3475
29 Jul 91	3	17.5175	6.4500	6.3150
29 Jul 91	4	17.4960	6.4440	6.2880
29 Jul 91	5	17.4600	6.4225	6.2825
29 Jul 91	6	17.4825	6.3800	6.2850
29 Jul 91	8	17.4900	6.4275	6.2525
29 Jul 91	9	17.5500	6.4400	6.2575
29 Jul 91	10	17.5500	6.4400	6.1950
29 Jul 91	11	17.4725	6.4425	6.2950
29 Jul 91	12	17.5300	6.4550	6.3450
29 Jul 91	13	17.7275	6.4775	6.3800
29 Jul 91	14	17.7450	6.4900	6.4150
29 Jul 91	15	17.7925	6.5000	6.4475
29 Jul 91	16	17.8040	6.5220	6.5060
29 Jul 91	17	17.7125	6.5275	6.5325
29 Jul 91	18	17.8800	6.5525	6.6525

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
29 Jul 91	19	18.3575	6.6100	6.7400
29 Jul 91	20	18.3250	6.6200	6.7875
29 Jul 91	21	19.5275	6.7075	6.8325
29 Jul 91	22	17.6750	6.5225	6.5250
29 Jul 91	23	17.6450	6.5225	6.5500
30 Jul 91	0			
31 Jul 91	0	17.6250	6.5350	6.5650
31 Jul 91	1	17.6750	6.5350	6.5450
31 Jul 91	2	17.6200	6.5250	6.4950
31 Jul 91	3	17.6300	6.5150	6.4900
31 Jul 91	4	17.6450	6.5150	6.4400
31 Jul 91	5	17.5800	6.5100	6.3750
31 Jul 91	6	17.5600	6.4550	6.4000
31 Jul 91	7	17.8167	6.4733	6.3667
31 Jul 91	8	17.9425	6.4850	6.3225
31 Jul 91	9	18.0600	6.4675	6.3525
31 Jul 91	10	17.9900	6.4200	6.3750
31 Jul 91	11	17.9650	6.4900	6.4650
31 Jul 91	12	17.9175	6.4350	6.4175
31 Jul 91	13	18.2450	6.5475	6.5075
31 Jul 91	14	18.4325	6.4825	6.5750
31 Jul 91	15	18.5675	6.4825	6.6400
31 Jul 91	16	18.5240	6.5600	6.7040
31 Jul 91	17	18.5100	6.5600	6.6500
31 Jul 91	18	18.5975	6.5350	6.6750
31 Jul 91	19	19.3375	6.5800	6.8375
31 Jul 91	20	18.4775	6.5850	6.5725
31 Jul 91	21	18.3025	6.5575	6.6375
31 Jul 91	22	18.2900	6.4733	6.5633
31 Jul 91	23	18.3800	6.3050	6.4250
07 Aug 91	0	18.3850	6.4100	6.3700

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
07 Aug 91	1	18.3250	6.4850	6.4200
07 Aug 91	2	18.3250	6.3750	6.4050
07 Aug 91	3	18.3400	6.4100	6.4400
07 Aug 91	4	18.3267	6.3833	6.3700
07 Aug 91	5	18.3400	6.3950	6.3700
07 Aug 91	6	18.3550	6.4200	6.3400
07 Aug 91	7	18.3400	6.4200	6.2550
07 Aug 91	8	18.3300	6.4050	6.2600
07 Aug 91	9	18.3100	6.2750	6.2950
07 Aug 91	10	18.3150	6.3000	6.4350
07 Aug 91	11	18.3800	6.3850	6.3700
07 Aug 91	12	18.5900	6.4500	6.3950
07 Aug 91	13	18.8100	6.3800	6.4700
07 Aug 91	14	18.7200	6.3850	6.4900
07 Aug 91	15	18.7550	6.3750	6.4750
07 Aug 91	16	18.4100	6.4000	6.4300
07 Aug 91	17	18.2600	6.3300	6.4250
07 Aug 91	18	18.8750	6.6000	6.6000
07 Aug 91	19	19.9850	6.6400	6.8300
07 Aug 91	20	18.9600	6.5650	6.5700
07 Aug 91	21	18.5250	6.5550	6.3900
07 Aug 91	22	18.2850	6.4500	6.3650
07 Aug 91	23	18.2150	6.3800	6.3350
08 Aug 91	0	18.6850	6.5800	6.5600
08 Aug 91	1	18.6800	6.5650	6.5200
08 Aug 91	2	18.6750	6.5600	6.4900
08 Aug 91	3	18.6600	6.5650	6.5150
08 Aug 91	4	18.6600	6.5600	6.4800
08 Aug 91	5	18.6600	6.5400	6.4550
08 Aug 91	6	18.6500	6.5550	6.4450
08 Aug 91	7	18.3875	6.4725	6.2725
08 Aug 91	8	18.4075	6.4975	6.2600

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
08 Aug 91	9	18.4225	6.4500	6.2850
08 Aug 91	10	18.4400	6.4875	6.3325
08 Aug 91	11	18.4625	6.4875	6.3775
08 Aug 91	12	18.7675	6.5350	6.4350
08 Aug 91	13	18.7450	6.4600	6.3875
08 Aug 91	14	18.6800	6.4500	6.4175
08 Aug 91	15	18.6525	6.4500	6.4000
08 Aug 91	16	18.5700	6.3460	6.3340
08 Aug 91	17	18.4775	6.4050	6.3075
08 Aug 91	18	19.0575	6.4250	6.3925
08 Aug 91	19	18.7725	6.4400	6.3525
08 Aug 91	20	18.7075	6.4900	6.3650
08 Aug 91	21	18.7250	6.5475	6.4075
08 Aug 91	22	18.3850	6.5100	6.4100
08 Aug 91	23	18.3950	6.5325	6.3775
09 Aug 91	0			
10 Aug 91	0	18.2875	6.4675	6.1175
10 Aug 91	1	18.3125	6.4825	6.1050
10 Aug 91	2	18.3000	6.4825	6.0900
10 Aug 91	3	18.2850	6.4700	6.0800
10 Aug 91	4	18.3000	6.4800	6.0825
10 Aug 91	5	18.3000	6.4850	6.0500
10 Aug 91	6	18.2800	6.4875	6.0250
10 Aug 91	7	18.2800	6.4875	6.0250
10 Aug 91	8	18.2750	6.4650	6.0275
10 Aug 91	9	18.3500	6.3600	6.0360
10 Aug 91	10	18.3175	6.3875	6.0075
10 Aug 91	11	18.3325	6.3800	6.0300
10 Aug 91	12	18.4150	6.3525	6.0300
10 Aug 91	13	18.7050	6.3825	6.1325
10 Aug 91	14	18.8725	6.3800	6.1825
10 Aug 91	15	18.9525	6.3750	6.1825

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
10 Aug 91	16	18.9600	6.3450	6.1625
10 Aug 91	17	19.0750	6.3150	6.1325
10 Aug 91	18	19.3100	6.3950	6.1100
10 Aug 91	19	19.5750	6.3650	6.0625
10 Aug 91	20	18.9275	6.3875	6.0450
10 Aug 91	21	18.7120	6.4260	6.0460
10 Aug 91	22	18.7475	6.4275	6.0050
10 Aug 91	23	18.7525	6.3625	5.9725
11 Aug 91	0			
12 Aug 91	0	18.9500	6.2750	5.8400
12 Aug 91	1	18.9350	6.2800	5.8300
12 Aug 91	2	18.9250	6.2700	5.8050
12 Aug 91	3	18.9250	6.2700	5.8200
12 Aug 91	4	18.9200	6.2800	5.7650
12 Aug 91	5	18.9200	6.2950	5.8100
12 Aug 91	6	18.9100	6.2900	5.7600
12 Aug 91	7	18.9200	6.2550	5.7300
12 Aug 91	8	18.9200	6.2300	5.7000
12 Aug 91	9	18.9400	6.1700	5.7350
12 Aug 91	10	18.9450	6.1700	5.8000
12 Aug 91	11	19.1000	6.2100	5.8450
12 Aug 91	12	19.2050	6.2150	5.8150
12 Aug 91	13	19.1200	6.2100	5.8800
12 Aug 91	14	18.9400	6.2450	5.8700
12 Aug 91	15	19.2600	6.3050	5.9550
12 Aug 91	16	19.7250	6.3850	6.0450
12 Aug 91	17	19.8950	6.3950	6.0650
12 Aug 91	18	20.0500	6.4250	6.0200
12 Aug 91	19	20.8700	6.4050	5.8650
12 Aug 91	20	20.9200	6.3850	5.8750
12 Aug 91	21	21.3350	6.3550	5.6800
12 Aug 91	22	19.6300	6.3050	5.9050

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
12 Aug 91	23	19.4400	6.3000	5.9300
13 Aug 91	0	19.4250	6.3050	5.9050
13 Aug 91	1	19.4900	6.3200	5.8750
13 Aug 91	2	19.4550	6.3250	5.8400
13 Aug 91	3	19.4050	6.3300	5.8500
13 Aug 91	4	19.4350	6.3350	5.8100
13 Aug 91	5	19.4550	6.3200	5.8050
13 Aug 91	6	19.4350	6.3250	5.7550
13 Aug 91	7	19.4150	6.3250	5.7500
13 Aug 91	8	19.4250	6.3200	5.7850
13 Aug 91	9	19.4450	6.2850	5.8350
13 Aug 91	10	19.4500	6.2650	5.8450
13 Aug 91	11	19.4750	6.2550	5.8500
13 Aug 91	12	19.6750	6.2900	5.9050
13 Aug 91	13	19.7133	6.2867	5.9500
13 Aug 91	14	19.3600	6.3000	5.9700
14 Aug 91	0			
29 Aug 91	16	19.8000	6.4100	5.1300
29 Aug 91	17	19.7600	6.5200	5.1800
29 Aug 91	18	19.5200	6.4800	5.1800
29 Aug 91	19	19.4800	6.5100	5.1500
29 Aug 91	20	19.3900	6.5600	5.1400
29 Aug 91	21	19.3400	6.6200	5.1500
29 Aug 91	22	19.5000	6.6300	5.1900
29 Aug 91	23	19.7500	6.6500	5.1900
30 Aug 91	0	19.7100	6.6200	5.1400
30 Aug 91	1	19.3900	6.6000	5.1100
30 Aug 91	2	19.2300	6.5900	5.1000
30 Aug 91	3	19.2300	6.5800	5.0700
30 Aug 91	4	19.2100	6.5800	5.0400
30 Aug 91	5	19.2400	6.5800	5.0400
30 Aug 91	6	19.2400	6.5800	5.0600

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
30 Aug 91	7	19.2400	6.5800	5.1200
30 Aug 91	8	19.2300	6.5700	5.1200
30 Aug 91	9	19.2400	6.5800	5.1400
30 Aug 91	10	19.5500	6.6000	5.1700
30 Aug 91	11	19.5300	6.6000	5.1700
30 Aug 91	12	19.5400	6.6200	5.2800
30 Aug 91	13	19.7300	6.6600	5.3100
30 Aug 91	14	19.9500	6.6800	5.3500
30 Aug 91	15	19.9100	6.6800	5.3800
30 Aug 91	16	20.0500	6.7100	5.4600
30 Aug 91	17	19.9600	6.7300	5.4800
30 Aug 91	18	20.0900	6.7600	5.5100
30 Aug 91	19	20.1100	6.7400	5.5000
30 Aug 91	20	19.8600	6.7100	5.4200
30 Aug 91	21	19.8500	6.7100	5.4200
30 Aug 91	22	19.9700	6.7300	5.4900
30 Aug 91	23	19.9600	6.7100	5.4400
31 Aug 91	0	19.9000	6.6300	5.3900
31 Aug 91	1	19.8400	6.6200	5.3800
31 Aug 91	2	19.7800	6.6000	5.3500
31 Aug 91	3	19.8300	6.6000	5.3600
31 Aug 91	4	19.7700	6.6500	5.3000
31 Aug 91	5	19.7600	6.6400	5.2800
31 Aug 91	6	19.7600	6.6500	5.2800
31 Aug 91	7	19.7600	6.6700	5.3100
31 Aug 91	8	19.7700	6.6600	5.3000
31 Aug 91	9	19.8000	6.6700	5.3200
31 Aug 91	10	19.8100	6.6500	5.3400
31 Aug 91	11	19.8100	6.6800	5.3400
31 Aug 91	12	20.1600	6.6900	5.3700
31 Aug 91	13	20.2400	6.7100	5.3500
31 Aug 91	14	20.0100	6.6400	5.3400

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
31 Aug 91	15	19.8600	6.5900	5.3600
31 Aug 91	16	19.8600	6.4900	5.3500
31 Aug 91	17	19.7800	6.6600	5.3300
31 Aug 91	18	19.7400	6.6100	5.3700
31 Aug 91	19	19.8500	6.6800	5.4500
31 Aug 91	20	20.0700	6.7300	5.4700
31 Aug 91	21	20.2700	6.7000	5.5500
31 Aug 91	22	20.1700	6.6800	5.4900
31 Aug 91	23	19.7000	6.6300	5.4200
01 Sep 91	0	19.7300	6.6200	5.4000
01 Sep 91	1	19.6100	6.5800	5.4000
01 Sep 91	2	19.6300	6.6500	5.4100
01 Sep 91	3	19.5700	6.6100	5.3300
01 Sep 91	4	19.5500	6.6100	5.3400
01 Sep 91	5	19.5400	6.5300	5.3500
01 Sep 91	6	19.5400	6.5900	5.3500
01 Sep 91	7	19.5100	6.5400	5.3300
01 Sep 91	8	19.5200	6.5800	5.3200
01 Sep 91	9	19.5300	6.6200	5.3100
01 Sep 91	10	19.5300	6.6000	5.3200
01 Sep 91	11	19.5400	6.5700	5.3800
01 Sep 91	12	19.9800	6.6300	5.4400
01 Sep 91	13	20.0900	6.5600	5.4300
01 Sep 91	14	19.9300	6.4100	5.4200
01 Sep 91	15	19.8900	6.4500	5.4600
01 Sep 91	16	19.9000	6.4700	5.4500
01 Sep 91	17	19.7900	6.5000	5.4200
01 Sep 91	18	19.6800	6.5000	5.3900
01 Sep 91	19	19.5900	6.4800	5.3600
01 Sep 91	20	19.5700	6.5500	5.3600
01 Sep 91	21	19.5100	6.4100	5.3400
01 Sep 91	22	19.4900	6.4400	5.3300

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
01 Sep 91	23	19.3900	6.5300	5.3000
02 Sep 91	0	19.3800	6.4500	5.2900
02 Sep 91	1	19.3700	6.5800	5.2700
02 Sep 91	2	19.3700	6.5000	5.2700
02 Sep 91	3	19.3600	6.5300	5.2500
02 Sep 91	4	19.3500	6.5800	5.2500
02 Sep 91	5	19.3300	6.5000	5.2100
02 Sep 91	6	19.3300	6.5000	5.2200
02 Sep 91	7	19.3400	6.5200	5.2200
02 Sep 91	8	19.3400	6.5000	5.2200
02 Sep 91	9	19.3600	6.5200	5.2400
02 Sep 91	10	19.3600	6.4700	5.2600
02 Sep 91	11	19.3700	6.4000	5.2800
02 Sep 91	12	19.3800	6.4000	5.2600
02 Sep 91	13	19.9400	6.5100	5.3200
02 Sep 91	14	19.8700	6.4900	5.3000
02 Sep 91	15	19.7900	6.5000	5.3300
02 Sep 91	16	19.7200	6.4900	5.2900
02 Sep 91	17	19.6800	6.4600	5.2700
02 Sep 91	18	19.5700	6.4900	5.2500
02 Sep 91	19	19.4200	6.4600	5.2200
02 Sep 91	20	19.4000	6.4300	5.2200
02 Sep 91	21	19.3200	6.4900	5.2100
02 Sep 91	22	19.3400	6.4700	5.2300
02 Sep 91	23	19.1700	6.4500	5.2100
03 Sep 91	0	19.0800	6.4500	5.2000
03 Sep 91	1	19.0800	6.4300	5.2000
03 Sep 91	2	19.0900	6.4400	5.1800
03 Sep 91	3	19.0900	6.4600	5.1900
03 Sep 91	4	19.0800	6.4800	5.1600
03 Sep 91	5	19.0800	6.4300	5.1600
03 Sep 91	6	19.0800	6.4600	5.1500

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
03 Sep 91	7	19.0800	6.5000	5.1200
03 Sep 91	8	19.0800	6.4800	5.1200
03 Sep 91	9	19.0800	6.4400	5.1200
03 Sep 91	10	19.1000	6.3800	5.1600
03 Sep 91	11	19.3700	6.4400	5.1900
03 Sep 91	12	19.4600	6.4700	5.1700
03 Sep 91	13	19.4200	6.4500	5.1600
03 Sep 91	14	19.4000	6.4400	5.1300
03 Sep 91	15	19.5700	6.5100	5.2100
03 Sep 91	16	19.7000	6.5800	5.2600
03 Sep 91	17	19.7400	6.5100	5.2800
03 Sep 91	18	19.7400	6.5500	5.2700
03 Sep 91	19	19.8400	6.5600	5.3200
03 Sep 91	20	19.8900	6.5500	5.2800
03 Sep 91	21	19.8300	6.5800	5.2700
03 Sep 91	22	19.6900	6.5300	5.2600
03 Sep 91	23	19.5900	6.5400	5.2900
04 Sep 91	0	19.5200	6.5700	5.2600
04 Sep 91	1	19.5400	6.5000	5.2700
04 Sep 91	2	19.4200	6.5200	5.2100
04 Sep 91	3	19.4400	6.5300	5.2400
04 Sep 91	4	19.4600	6.4500	5.2400
04 Sep 91	5	19.4400	6.4500	5.2100
04 Sep 91	6	19.4400	6.4500	5.2000
04 Sep 91	7	19.4000	6.4300	5.1800
04 Sep 91	8	19.4400	6.5300	5.1900
04 Sep 91	9	19.4200	6.5500	5.1600
04 Sep 91	10	19.4100	6.4600	5.1400
04 Sep 91	11	19.5600	6.4100	5.1800
04 Sep 91	12	19.9000	6.4700	5.2400
04 Sep 91	13	19.7400	6.4000	5.1700
04 Sep 91	14	19.9000	6.4800	5.2600

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
04 Sep 91	15	20.1300	6.5200	5.3100
04 Sep 91	16	20.0500	6.4700	5.3100
04 Sep 91	17	19.9500	6.4500	5.2700
04 Sep 91	18	20.0000	6.5000	5.2200
04 Sep 91	19	19.9100	6.4700	5.2300
04 Sep 91	20	19.8000	6.4600	5.2500
04 Sep 91	21	19.8400	6.5000	5.2400
04 Sep 91	22	19.6800	6.5300	5.2500
04 Sep 91	23	19.7100	6.4900	5.2400
05 Sep 91	0	19.5900	6.5200	5.2200
05 Sep 91	1	19.5700	6.5200	5.2200
05 Sep 91	2	19.5800	6.4900	5.2100
05 Sep 91	3	19.5700	6.4600	5.2100
05 Sep 91	4	19.5500	6.4900	5.2000
05 Sep 91	5	19.5500	6.4900	5.1900
05 Sep 91	6	19.5500	6.4500	5.1800
05 Sep 91	7	19.5500	6.4600	5.1600
05 Sep 91	8	19.5400	6.4100	5.1700
05 Sep 91	9	19.5200	6.4600	5.1200
05 Sep 91	10	19.5400	6.4300	5.1900
05 Sep 91	11	19.5900	6.4500	5.2000
05 Sep 91	12	19.5300	6.4100	5.2100
05 Sep 91	13	19.6000	6.4100	5.2600
05 Sep 91	14	19.6300	6.4400	5.3300
05 Sep 91	15	19.9200	6.4800	5.3600
05 Sep 91	16	20.2100	6.5500	5.2700
05 Sep 91	17	19.7800	6.4900	5.2300
05 Sep 91	18	19.4300	6.5000	5.0800
05 Sep 91	19	19.4500	6.5500	5.0400
05 Sep 91	20	19.5100	6.5600	5.0300
05 Sep 91	21	19.3900	6.5600	5.0300
05 Sep 91	22	19.2100	6.5500	5.0400

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
05 Sep 91	23	19.1300	6.5400	5.0500
06 Sep 91	0	19.1600	6.5300	5.0300
06 Sep 91	1	19.1900	6.5500	5.0300
06 Sep 91	2	19.1600	6.5500	5.0300
06 Sep 91	3	19.1500	6.5500	5.0600
06 Sep 91	4	19.1400	6.5500	5.0500
06 Sep 91	5	19.1200	6.5400	5.0300
06 Sep 91	6	19.1200	6.5400	5.0300
06 Sep 91	7	19.1200	6.5400	5.0200
06 Sep 91	8	19.1400	6.5400	5.0200
06 Sep 91	9	19.1200	6.5300	4.9800
06 Sep 91	10	19.1500	6.5500	5.0400
06 Sep 91	11	19.1800	6.5600	5.0800
06 Sep 91	12	19.4200	6.5000	5.0600
06 Sep 91	13	19.5600	6.4900	5.0200
06 Sep 91	14	19.5600	6.4900	5.0600
06 Sep 91	15	20.1000	6.5200	4.9900
06 Sep 91	16	19.8600	6.5000	5.0400
06 Sep 91	17	19.7800	6.4800	5.0300
06 Sep 91	18	19.6700	6.5100	5.0000
06 Sep 91	19	19.6000	6.4000	5.0000
06 Sep 91	20	19.4900	6.4700	5.0300
06 Sep 91	21	19.6400	6.4600	5.0400
06 Sep 91	22	19.5700	6.4800	5.1100
06 Sep 91	23	19.4500	6.5100	5.1100
07 Sep 91	0	19.4100	6.4400	5.1300
07 Sep 91	1	19.3100	6.4400	5.1300
07 Sep 91	2	19.2800	6.4500	5.1200
07 Sep 91	3	19.3000	6.5500	5.0900
07 Sep 91	4	19.2700	6.5400	5.0900
07 Sep 91	5	19.2400	6.5500	5.0800
07 Sep 91	6	19.2700	6.5500	5.0500

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
07 Sep 91	7	19.3500	6.5500	5.0200
07 Sep 91	8	19.2600	6.5600	5.0500
07 Sep 91	9	19.2300	6.5600	5.0600
07 Sep 91	10	19.2600	6.5400	5.0200
07 Sep 91	11	19.5200	6.5200	5.0600
07 Sep 91	12	19.7500	6.4900	5.0800
07 Sep 91	13	19.8300	6.5400	5.1200
07 Sep 91	14	20.1900	6.6200	5.1700
07 Sep 91	15	20.3200	6.6400	5.2400
07 Sep 91	16	20.4500	6.6200	5.2700
07 Sep 91	17	20.4400	6.6500	5.3100
07 Sep 91	18	20.3400	6.6400	5.3100
07 Sep 91	19	20.3800	6.6200	5.3300
07 Sep 91	20	20.4400	6.6300	5.3500
07 Sep 91	21	20.4300	6.6400	5.3700
07 Sep 91	22	20.5300	6.6300	5.3100
07 Sep 91	23	20.4800	6.6100	5.2900
08 Sep 91	0	20.3900	6.5700	5.2800
08 Sep 91	1	20.3500	6.6000	5.3200
08 Sep 91	2	20.1800	6.5700	5.3200
08 Sep 91	3	20.1900	6.5900	5.3100
08 Sep 91	4	20.1600	6.5600	5.2800
08 Sep 91	5	20.1600	6.5300	5.2800
08 Sep 91	6	20.2400	6.5600	5.3000
08 Sep 91	7	20.2800	6.5600	5.2700
08 Sep 91	8	20.1900	6.5700	5.2600
08 Sep 91	9	20.1100	6.5800	5.2900
08 Sep 91	10	20.2200	6.6000	5.3000
08 Sep 91	11	20.3200	6.5800	5.1900
08 Sep 91	12	20.3800	6.6000	5.3000
08 Sep 91	13	20.6300	6.5900	5.3100
08 Sep 91	14	20.5300	6.6100	5.3100

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
08 Sep 91	15	20.4600	6.6000	5.3600
08 Sep 91	16	20.5900	6.5700	5.3400
08 Sep 91	17	20.4300	6.5800	5.3400
08 Sep 91	18	20.1800	6.6000	5.2700
08 Sep 91	19	20.1600	6.6200	5.2700
08 Sep 91	20	20.5200	6.5900	5.2400
08 Sep 91	21	20.4700	6.6200	5.3100
08 Sep 91	22	20.2500	6.5900	5.3300
08 Sep 91	23	20.1000	6.6200	5.3600
09 Sep 91	0	20.0700	6.6100	5.3500
09 Sep 91	1	20.0600	6.6000	5.3300
09 Sep 91	2	20.1200	6.6100	5.3300
09 Sep 91	3	20.1000	6.5400	5.3300
09 Sep 91	4	20.0500	6.5600	5.3100
09 Sep 91	5	20.0500	6.5500	5.2900
09 Sep 91	6	20.0500	6.5300	5.3000
09 Sep 91	7	20.0400	6.4900	5.2800
09 Sep 91	8	20.0200	6.5400	5.2700
09 Sep 91	9	20.0200	6.6200	5.3000
09 Sep 91	10	20.1200	6.5900	5.3200
09 Sep 91	11	20.2800	6.5100	5.3200
09 Sep 91	12	20.3000	6.5200	5.3100
09 Sep 91	13	20.1300	6.5000	5.3200
09 Sep 91	14	20.1300	6.1500	5.6400
09 Sep 91	15	19.8100	5.5800	6.2800
09 Sep 91	16	19.8300	5.6400	6.2100
09 Sep 91	17	19.8100	5.6700	6.2000
09 Sep 91	18	19.7500	5.6800	6.1400
09 Sep 91	19	19.7200	5.6700	6.0800
09 Sep 91	20	19.6200	5.7100	6.2000
09 Sep 91	21	19.7300	5.7300	6.2400
09 Sep 91	22	19.9800	5.7700	6.3300

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
09 Sep 91	23	19.9400	5.7600	6.3800
10 Sep 91	0	19.6700	5.7400	6.3100
10 Sep 91	1	19.6300	5.7400	6.3200
10 Sep 91	2	19.6400	5.7500	6.3300
10 Sep 91	3	19.6400	5.7600	6.3200
10 Sep 91	4	19.6300	5.7500	6.3000
10 Sep 91	5	19.6300	5.7700	6.2900
10 Sep 91	6	19.6200	5.7700	6.2700
10 Sep 91	7	19.6200	5.7800	6.2900
10 Sep 91	8	19.6100	5.7700	6.2800
10 Sep 91	9	19.6100	5.7800	6.2800
10 Sep 91	10	19.6300	5.7800	6.3300
10 Sep 91	11	19.6200	5.7800	6.3200
10 Sep 91	12	19.6200	5.7900	7.5600
11 Sep 91	0			
17 Sep 91	12	20.7600	8.2300	8.2300
17 Sep 91	13	20.5700	8.2200	7.6200
17 Sep 91	14	20.3900	8.2000	7.6500
17 Sep 91	15	20.3800	8.2000	7.9100
17 Sep 91	16	20.4900	8.2200	10.6000
17 Sep 91	17	20.7000	8.2600	10.9400
17 Sep 91	18	20.5300	8.2500	10.9900
17 Sep 91	19	20.3800	8.2300	11.0100
17 Sep 91	20	20.3900	8.2300	11.0100
17 Sep 91	21	20.5400	8.2400	10.8900
17 Sep 91	22	20.6200	8.2500	10.9500
17 Sep 91	23	20.7000	8.2400	10.8200
18 Sep 91	0	20.5300	8.2600	10.9900
18 Sep 91	1	20.4600	8.2500	11.0000
18 Sep 91	2	20.4600	8.2400	11.0500
18 Sep 91	3	20.4500	8.2400	11.0800
18 Sep 91	4	20.4900	8.2500	11.0600

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
18 Sep 91	5	20.4800	8.2500	10.9400
18 Sep 91	6	20.4700	8.2300	10.8100
18 Sep 91	7	20.4400	8.2200	10.8500
18 Sep 91	8	20.4800	8.2200	10.7100
18 Sep 91	9	20.5200	8.2400	10.8600
18 Sep 91	10	20.5600	8.2500	10.7700
18 Sep 91	11	20.6100	8.3100	11.0600
18 Sep 91	12	20.7000	8.3500	11.3100
18 Sep 91	13	20.9900	8.3200	11.0000
18 Sep 91	14	20.7600	8.2900	10.8500
18 Sep 91	15	20.4000	8.2200	10.3200
18 Sep 91	16	20.3200	8.2000	10.6100
18 Sep 91	17	20.1700	8.2000	10.4700
18 Sep 91	18	20.2700	8.2200	10.5800
18 Sep 91	19	20.2900	8.2100	10.5000
18 Sep 91	20	20.2700	8.2100	11.0900
18 Sep 91	21	20.2200	8.2100	10.9500
18 Sep 91	22	20.0500	8.1800	10.2000
18 Sep 91	23	20.2800	8.1900	10.2600
19 Sep 91	0	20.2800	8.1900	10.0000
19 Sep 91	1	20.1700	8.1800	9.7700
19 Sep 91	2	20.1600	8.1800	9.9700
19 Sep 91	3	20.1900	8.1800	9.9000
19 Sep 91	4	20.2200	8.1700	9.6700
19 Sep 91	5	20.3600	8.1800	9.8000
19 Sep 91	6	20.3500	8.1700	9.7600
19 Sep 91	7	20.2400	8.1700	9.6100
19 Sep 91	8	20.2300	8.1800	9.7300
19 Sep 91	9	20.3500	8.1700	9.6300
19 Sep 91	10	20.1600	8.1600	9.6900
19 Sep 91	11	20.0700	8.1500	9.7400
19 Sep 91	12	20.0500	8.1700	9.6500

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
19 Sep 91	13	20.0700	8.1800	9.6900
19 Sep 91	14	20.0900	8.1900	9.5800
19 Sep 91	15	20.0900	8.1900	9.9300
19 Sep 91	16	19.9000	8.1600	9.9100
19 Sep 91	17	19.8300	8.1600	10.0300
19 Sep 91	18	20.0200	8.1900	10.0000
19 Sep 91	19	20.0900	8.2000	9.8700
19 Sep 91	20	20.2400	8.2200	9.9100
19 Sep 91	21	20.2800	8.2100	9.8700
19 Sep 91	22	20.2300	8.1700	9.6000
19 Sep 91	23	20.1200	8.1700	9.4700
20 Sep 91	0	20.0900	8.1600	9.3600
20 Sep 91	1	20.0500	8.1500	9.0900
20 Sep 91	2	19.9700	8.1500	9.1200
20 Sep 91	3	19.9300	8.1500	8.9700
20 Sep 91	4	19.9000	8.1500	8.9700
20 Sep 91	5	19.8700	8.1500	9.0300
20 Sep 91	6	19.8500	8.1500	9.1700
20 Sep 91	7	19.6900	8.1500	9.4500
20 Sep 91	8	19.6800	8.1400	9.3800
20 Sep 91	9	19.6600	8.1300	9.2500
20 Sep 91	10	19.8100	8.1500	9.2000
20 Sep 91	11	20.0400	8.2100	9.3500
20 Sep 91	12	20.2300	8.2800	9.4400
20 Sep 91	13	20.4200	8.3000	9.5100
20 Sep 91	14	20.6400	8.2900	9.5000
20 Sep 91	15	20.5500	8.3200	9.7200
20 Sep 91	16	20.7300	8.2900	9.5200
20 Sep 91	17	20.7000	8.2700	9.6100
20 Sep 91	18	20.4900	8.2900	9.7200
20 Sep 91	19	20.3600	8.2800	9.7100
20 Sep 91	20	20.4100	8.3100	10.0300

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
20 Sep 91	21	20.3900	8.3200	9.7900
20 Sep 91	22	20.2200	8.2700	9.5900
20 Sep 91	23	20.1200	8.2600	9.4900
21 Sep 91	0	20.1500	8.2400	9.2900
21 Sep 91	1	20.1300	8.2200	9.0800
21 Sep 91	2	20.0900	8.2200	9.0400
21 Sep 91	3	20.0700	8.2100	8.9200
21 Sep 91	4	20.0400	8.2100	8.9100
21 Sep 91	5	19.9900	8.1900	8.8900
21 Sep 91	6	19.9900	8.1500	8.5500
21 Sep 91	7	19.9600	8.1800	8.7100
21 Sep 91	8	19.9100	8.2100	9.0200
21 Sep 91	9	19.7600	8.2200	9.1900
21 Sep 91	10	19.7300	8.2000	9.2500
21 Sep 91	11	19.9500	8.2300	9.1400
21 Sep 91	12	20.1400	8.2900	9.1700
21 Sep 91	13	20.4900	8.3300	9.1100
21 Sep 91	14	20.6800	8.3300	9.1900
21 Sep 91	15	20.7800	8.2800	8.9500
21 Sep 91	16	20.8300	8.2800	8.9800
21 Sep 91	17	20.9700	8.2700	9.0400
21 Sep 91	18	20.8600	8.3000	9.2300
21 Sep 91	19	20.8200	8.2900	9.2300
21 Sep 91	20	20.5600	8.2800	9.2600
21 Sep 91	21	20.2100	8.2300	9.0700
21 Sep 91	22	19.9600	8.2100	9.0000
21 Sep 91	23	19.9900	8.1700	8.6900
22 Sep 91	0	19.9400	8.1700	8.6600
22 Sep 91	1	19.9400	8.1500	8.4400
22 Sep 91	2	19.8900	8.1600	8.5300
22 Sep 91	3	19.8500	8.1600	8.5000
22 Sep 91	4	19.8300	8.1500	8.4200

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
22 Sep 91	5	19.7200	8.1700	8.6500
22 Sep 91	6	19.7500	8.1600	8.4500
22 Sep 91	7	19.7000	8.1700	8.5600
22 Sep 91	8	19.7500	8.1500	8.3700
22 Sep 91	9	19.6900	8.1900	8.6600
22 Sep 91	10	19.6300	8.2100	8.8000
22 Sep 91	11	19.6100	8.2000	8.6600
22 Sep 91	12	19.8000	8.2200	8.6000
22 Sep 91	13	20.0600	8.2100	8.5900
22 Sep 91	14	20.9300	8.1800	8.2100
22 Sep 91	15	21.0400	8.2000	8.3100
22 Sep 91	16	21.2300	8.2300	8.4600
10 Feb 92	17	5.8600	9.5000	11.3400
10 Feb 92	18	5.5800	9.2500	11.0700
10 Feb 92	19	5.8200	8.5400	10.9700
10 Feb 92	20	5.5900	8.4100	11.0100
10 Feb 92	21	5.5600	8.3300	11.0900
10 Feb 92	22	5.5800	8.3000	11.0900
10 Feb 92	23	5.6200	8.3000	11.1000
11 Feb 92	0	5.6700	8.3000	11.2700
11 Feb 92	1	5.7500	8.2900	11.2700
11 Feb 92	2	5.8400	8.2900	11.3200
11 Feb 92	3	5.9100	8.3000	11.3900
11 Feb 92	4	5.9500	8.3000	11.4500
11 Feb 92	5	5.9900	8.3100	11.5000
11 Feb 92	6	6.0400	8.3300	11.5700
11 Feb 92	7	6.1500	8.3200	11.5800
11 Feb 92	8	6.2400	8.3200	11.7100
11 Feb 92	9	6.4900	8.3700	11.6200
11 Feb 92	10	6.5800	8.3700	11.7300
11 Feb 92	11	6.6200	8.3700	11.7200
11 Feb 92	12	6.6000	8.3900	11.7300

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
11 Feb 92	13	6.5300	8.4200	11.8700
11 Feb 92	14	6.5100	8.4300	11.6100
11 Feb 92	15	6.4400	8.4200	11.5500
11 Feb 92	16	6.4400	8.4100	11.5100
11 Feb 92	17	6.4300	8.4100	11.5400
11 Feb 92	18	13.1800	8.9200	10.0800
11 Feb 92	19	5.8600	8.5300	10.9600
11 Feb 92	20	5.5800	8.4100	11.0900
11 Feb 92	21	5.5600	8.3300	11.0700
11 Feb 92	22	5.5800	8.3000	11.0900
11 Feb 92	23	5.6200	8.2900	11.1800
12 Feb 92	0			
13 Feb 92	10	22.4700	4.9900	6.3800
13 Feb 92	13	8.3400	8.1800	22.0800
13 Feb 92	14	8.3600	8.3000	14.6500
13 Feb 92	15	8.4500	8.4000	13.2400
13 Feb 92	16	8.4100	8.6100	17.1900
13 Feb 92	17	8.3700	8.3500	17.0900
13 Feb 92	18	8.4900	8.2700	17.2800
13 Feb 92	19	8.5600	8.2300	17.4300
13 Feb 92	20	8.5300	8.2300	17.4600
13 Feb 92	21	8.4300	8.2200	17.3100
13 Feb 92	22	8.4200	8.2200	17.1500
13 Feb 92	23	8.4300	8.1700	16.6300
14 Feb 92	0	8.5100	8.1300	16.1300
14 Feb 92	1	8.5400	8.1300	16.0900
14 Feb 92	2	8.6200	8.1100	15.8900
14 Feb 92	3	8.6600	8.1100	15.8300
14 Feb 92	4	8.7200	8.1100	15.7900
14 Feb 92	5	8.7400	8.1400	15.8800
14 Feb 92	6	8.7500	8.1400	15.9100
14 Feb 92	7	8.6800	8.1400	16.3700

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
14 Feb 92	8	8.5200	8.1700	16.7600
14 Feb 92	9	8.4100	8.2000	16.9700
14 Feb 92	10	8.4600	8.2000	16.8800
14 Feb 92	11	8.5000	8.1800	16.9000
14 Feb 92	12	8.5200	8.1700	16.8300
14 Feb 92	13	8.6000	8.1300	16.7400
14 Feb 92	14	9.1100	8.4300	15.4900
14 Feb 92	15	9.2400	8.2200	15.2200
14 Feb 92	16	9.3100	8.8300	15.2800
14 Feb 92	17	9.4900	8.7000	14.8800
14 Feb 92	18	9.6300	8.1000	14.6600
14 Feb 92	19	9.6600	8.0200	14.6200
14 Feb 92	20	9.3800	8.1200	15.4600
14 Feb 92	21	9.6000	8.0500	15.1800
14 Feb 92	22	8.8600	8.1800	16.5800
14 Feb 92	23	9.2300	8.1600	16.1300
15 Feb 92	0	8.8300	8.2300	16.7400
15 Feb 92	1	8.8100	8.2400	16.7100
15 Feb 92	2	8.7900	8.2600	16.7100
15 Feb 92	3	8.8200	8.2400	16.6700
15 Feb 92	4	9.0500	8.2000	16.2800
15 Feb 92	5	9.2500	8.1700	16.0800
15 Feb 92	6	8.8800	8.2200	16.4000
15 Feb 92	7	8.8400	8.2000	16.4800
15 Feb 92	8	9.3200	8.1100	15.7600
15 Feb 92	9	9.7400	8.0300	15.0400
15 Feb 92	10	9.2600	8.0600	15.8400
15 Feb 92	11	9.0800	8.1000	15.8500
15 Feb 92	12	9.9100	7.8700	14.8000
15 Feb 92	13	9.8200	7.8800	14.4900
15 Feb 92	14	9.4500	7.9600	15.2900
15 Feb 92	15	10.0700	7.8700	14.7500

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
15 Feb 92	16	10.4100	7.8700	14.1900
15 Feb 92	17	10.4300	7.9100	14.6100
15 Feb 92	18	10.4600	7.9400	14.7200
15 Feb 92	19	11.3300	7.8000	13.7100
15 Feb 92	20	11.5100	7.7800	13.5100
15 Feb 92	21	10.9600	7.8900	14.0400
15 Feb 92	22	9.7700	8.0500	15.3400
15 Feb 92	23	10.2500	7.9900	15.0900
16 Feb 92	0	10.8600	7.9500	14.4900
16 Feb 92	1	10.9400	7.8900	14.2900
16 Feb 92	2	10.6900	7.9000	14.2800
16 Feb 92	3	10.5200	7.9000	14.4700
16 Feb 92	4	10.6900	7.8700	14.2400
16 Feb 92	5	10.6100	7.8900	14.1600
16 Feb 92	6	10.5000	7.8700	14.3100
16 Feb 92	7	10.5000	7.8700	14.3300
16 Feb 92	8	10.9200	7.7900	13.7400
16 Feb 92	9	11.2400	7.7300	13.0400
16 Feb 92	10	10.9300	7.7600	13.3000
16 Feb 92	11	9.8500	7.9000	14.8500
16 Feb 92	12	9.8800	7.8900	15.1200
16 Feb 92	13	10.5600	7.8400	14.2600
16 Feb 92	14	10.8700	7.8300	14.1500
16 Feb 92	15	9.9900	7.9600	15.1900
16 Feb 92	16	9.9900	7.9800	15.3900
16 Feb 92	17	9.1300	8.0800	16.1800
16 Feb 92	18	10.5000	7.9700	15.3700
16 Feb 92	19	11.3700	7.9200	14.3900
16 Feb 92	20	11.8500	7.8500	13.9600
16 Feb 92	21	11.6000	7.8300	14.2200
16 Feb 92	22	11.0000	7.8700	14.4200
16 Feb 92	23	9.2800	8.0500	16.0300

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
17 Feb 92	0	9.1900	8.0600	15.8600
17 Feb 92	1	9.1900	8.0600	15.8400
17 Feb 92	2	8.4000	8.1200	16.7300
17 Feb 92	3	8.8000	8.0300	16.1400
17 Feb 92	4	8.6800	8.0000	16.0300
17 Feb 92	5	8.7600	7.9600	16.1000
17 Feb 92	6	9.7900	7.7600	14.7500
17 Feb 92	7	8.6000	7.9400	15.6000
17 Feb 92	8	8.1200	8.0500	17.1200
17 Feb 92	9	8.1800	8.1000	17.0800
17 Feb 92	10	8.3100	8.1100	16.9100
17 Feb 92	11	9.1200	7.9000	13.9900
17 Feb 92	12	9.8000	7.6800	14.0300
17 Feb 92	13	10.0600	7.6600	13.6100
17 Feb 92	14	9.6100	7.8000	14.5400
17 Feb 92	15	9.2300	7.9200	15.3200
17 Feb 92	16	9.4600	7.8800	15.1400
17 Feb 92	17	8.8400	8.0400	16.1400
17 Feb 92	18	9.4100	7.9100	15.4900
17 Feb 92	19	9.6800	7.9100	14.8100
17 Feb 92	20	9.7900	7.8700	14.8600
17 Feb 92	21	9.5400	7.8400	14.9500
17 Feb 92	22	9.0300	8.0300	15.9500
17 Feb 92	23	9.3300	7.9500	15.6700
18 Feb 92	0	8.5600	8.0700	16.5000
18 Feb 92	0			
18 Feb 92	1	8.3500	8.1200	16.8900
18 Feb 92	2	8.3500	8.1200	16.8500
18 Feb 92	3	8.3500	8.0600	16.8000
18 Feb 92	4	8.4200	8.0200	17.1200
19 Feb 92	0			
24 Feb 92	15	12.5000	8.1100	12.5400

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
24 Feb 92	16	12.6300	8.4900	10.3800
24 Feb 92	17	12.8800	7.9300	10.2500
24 Feb 92	18	13.1100	7.9000	10.1400
24 Feb 92	19	13.2100	7.8900	10.0900
24 Feb 92	20	13.2900	7.8900	10.0600
24 Feb 92	21	13.3400	7.8800	9.9900
24 Feb 92	22	13.3600	7.8900	9.9900
24 Feb 92	23	13.4200	7.8800	9.9900
25 Feb 92	0	13.3800	7.8700	10.0000
25 Feb 92	1	13.2200	7.8700	9.9600
25 Feb 92	2	13.0400	7.8600	9.9700
25 Feb 92	3	12.9500	7.8400	9.9400
25 Feb 92	4	12.8900	7.8100	9.9700
25 Feb 92	5	12.7400	7.7800	9.9800
25 Feb 92	6	12.5700	7.7700	9.9700
25 Feb 92	7	12.4200	7.7600	9.9500
25 Feb 92	8	12.2900	7.7500	9.9000
25 Feb 92	9	12.2500	7.7900	9.8700
25 Feb 92	10	12.2800	7.7600	9.8900
25 Feb 92	11	12.3400	7.7800	9.8700
25 Feb 92	12	12.3400	7.7600	9.8000
25 Feb 92	13	12.3100	7.7500	9.7200
25 Feb 92	14	12.3000	7.7400	9.7200
25 Feb 92	15	12.3000	7.7400	9.7000
25 Feb 92	16	12.2800	7.7400	9.6800
25 Feb 92	17	12.2800	7.7300	9.6200
25 Feb 92	18	12.1600	7.7700	9.6500
25 Feb 92	19	12.1500	7.7600	9.7300
25 Feb 92	20	12.4400	7.6600	9.9900
25 Feb 92	21	12.1500	7.7300	9.7000
25 Feb 92	22	12.3100	7.6400	9.5300
25 Feb 92	23	12.4100	7.6500	9.7200

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
26 Feb 92	0	12.4700	7.7100	9.7900
26 Feb 92	1	12.4500	7.7200	9.8300
26 Feb 92	2	12.4400	7.7300	9.8400
26 Feb 92	3	12.3300	7.7700	9.8200
26 Feb 92	4	12.2600	7.7300	9.7800
26 Feb 92	5	11.9500	7.7300	9.8900
26 Feb 92	6	11.9400	7.6500	9.8700
26 Feb 92	7	11.8000	7.6200	9.9000
26 Feb 92	8	11.6600	7.6000	9.9200
26 Feb 92	9	11.4600	7.5800	10.0700
26 Feb 92	10	11.2700	7.4500	17.7200
26 Feb 92	11	11.1400	7.3800	18.0000
26 Feb 92	12	11.0400	7.3800	18.1600
26 Feb 92	13	10.9400	7.3700	18.2800
26 Feb 92	14	10.9200	7.3400	18.2900
26 Feb 92	15	10.8300	7.3400	18.3900
26 Feb 92	16	10.6900	7.4100	18.1600
26 Feb 92	17	10.5900	7.3500	18.7000
26 Feb 92	18	10.5200	7.3600	18.7500
26 Feb 92	19	10.4500	7.3300	19.1500
26 Feb 92	20	10.3400	7.2900	19.3800
26 Feb 92	21	10.1700	7.3500	19.0100
26 Feb 92	22	10.0800	7.3100	18.8900
26 Feb 92	23	9.9700	7.3400	19.1300
27 Feb 92	0	9.8700	7.3800	19.3000
27 Feb 92	1	9.8000	7.4000	19.3300
27 Feb 92	2	9.7200	7.4100	19.3800
27 Feb 92	3	9.6800	7.3900	19.6200
27 Feb 92	4	9.6300	7.3200	20.1800
27 Feb 92	5	9.5400	7.3100	20.2800
27 Feb 92	6	9.4300	7.3100	20.3000
27 Feb 92	7	9.3100	7.3300	20.3200

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
27 Feb 92	8	9.5500	7.8400	20.6000
27 Feb 92	9	9.2700	7.5400	20.9000
27 Feb 92	10	9.0300	7.3300	20.3700
27 Feb 92	11	9.2800	7.5300	19.4900
27 Feb 92	12	9.3900	7.5300	19.3700
27 Feb 92	13	9.3500	7.3500	19.6100
27 Feb 92	14	9.5400	7.3300	19.4700
27 Feb 92	15	9.7900	7.3800	19.1600
27 Feb 92	16	10.0800	7.4100	18.8700
27 Feb 92	17	10.3200	7.4100	18.6700
27 Feb 92	18	10.5000	7.4500	18.7900
27 Feb 92	19	10.2900	7.9900	19.9900
27 Feb 92	20	10.0900	8.0800	20.5400
27 Feb 92	21	10.1200	7.9800	20.5400
27 Feb 92	22	10.4000	7.5300	19.2300
27 Feb 92	23	10.2900	7.5400	18.7500
28 Feb 92	0	10.1200	7.5000	18.8500
28 Feb 92	1	10.0100	7.4400	19.1900
28 Feb 92	2	9.9500	7.4300	19.3600
28 Feb 92	3	9.9100	7.4400	19.4100
28 Feb 92	4	9.8800	7.4500	19.3900
28 Feb 92	5	9.8400	7.4400	19.3000
28 Feb 92	6	9.7900	7.4500	19.2400
28 Feb 92	7	9.8200	7.9200	20.1800
28 Feb 92	8	9.7700	8.0500	20.7700
28 Feb 92	9	9.8700	8.0900	20.7800
28 Feb 92	10	9.7400	7.7200	19.9700
28 Feb 92	11	9.8400	7.5000	19.2200
28 Feb 92	12	9.9800	7.5000	18.9600
28 Feb 92	13	10.1600	7.4900	18.9800
02 Mar 92	10	10.6900	7.5600	18.5700
02 Mar 92	11	10.6300	7.3900	18.2100

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
02 Mar 92	12	10.6500	7.3700	18.0800
02 Mar 92	13	10.8600	7.4500	17.9900
02 Mar 92	14	11.4400	7.5700	17.4500
02 Mar 92	15	11.5700	7.5800	17.1400
02 Mar 92	16	12.0100	7.5900	16.8500
02 Mar 92	17	11.8400	7.4700	16.9500
02 Mar 92	18	11.9100	7.5200	16.8900
02 Mar 92	19	11.8800	7.5800	16.8700
02 Mar 92	20	12.1500	7.5700	16.6700
02 Mar 92	21	12.3700	7.5700	16.4700
02 Mar 92	22	12.3300	7.5900	16.4600
02 Mar 92	23	12.1400	7.6100	16.5800
03 Mar 92	0	11.9300	7.6500	16.7200
03 Mar 92	1	11.7300	7.6500	16.8900
03 Mar 92	2	11.7500	7.6000	16.8900
03 Mar 92	3	11.7500	7.5600	16.8800
03 Mar 92	4	11.6600	7.5400	16.9600
03 Mar 92	5	11.4300	7.5400	17.2100
03 Mar 92	6	11.4500	7.5200	17.2900
03 Mar 92	7	11.3300	7.4900	17.7900
03 Mar 92	8	11.1100	7.4800	18.2500
03 Mar 92	9	10.9800	7.5900	18.3000
03 Mar 92	10	10.9200	7.6900	18.2600
03 Mar 92	11	11.1100	7.5800	17.6000
03 Mar 92	12	11.3800	7.5100	17.0000
03 Mar 92	13	11.5500	7.4800	16.8700
03 Mar 92	14	11.7900	7.4500	16.8200
03 Mar 92	15	11.9900	7.4800	16.6200
03 Mar 92	16	11.8700	7.6700	16.5400
03 Mar 92	17	12.2900	7.5900	16.1600
03 Mar 92	18	12.1300	7.7500	16.1900
03 Mar 92	19	12.1400	7.8000	16.1800

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
03 Mar 92	20	11.9400	7.8400	16.3000
03 Mar 92	21	12.1300	7.8300	16.1400
03 Mar 92	22	12.3700	7.7900	15.9400
03 Mar 92	23	12.0800	7.8300	16.1000
04 Mar 92	0	11.9600	7.8200	16.1900
04 Mar 92	1	12.1700	7.7700	16.0400
04 Mar 92	2	12.2700	7.7600	15.9300
04 Mar 92	3	12.2700	7.7800	15.9500
04 Mar 92	4	12.3600	7.7900	15.8700
04 Mar 92	5	12.3000	7.7500	16.0000
04 Mar 92	6	12.1300	7.7600	16.1300
04 Mar 92	7	11.8800	7.7900	16.3400
04 Mar 92	8	11.9800	7.8000	16.6000
04 Mar 92	9	12.1300	7.8400	16.7500
04 Mar 92	10	12.2100	7.7500	16.4300
04 Mar 92	11	12.1200	7.6800	16.6100
04 Mar 92	12	12.4300	7.6700	15.9900
04 Mar 92	13	12.3300	7.6800	15.6700
04 Mar 92	14	12.6500	7.6500	15.4400
04 Mar 92	15	12.4800	7.7700	15.4800
04 Mar 92	16	12.1300	7.8200	15.8700
04 Mar 92	17	11.9600	7.8600	15.9400
04 Mar 92	18	11.8500	7.8500	15.9700
04 Mar 92	19	11.9200	7.8600	15.9300
04 Mar 92	20	12.0700	7.8500	15.8000
04 Mar 92	21	12.1600	7.8400	15.7400
04 Mar 92	22	12.1500	7.8200	15.7300
04 Mar 92	23	12.2700	7.8100	15.6400
05 Mar 92	0	12.3400	7.8000	15.5800
05 Mar 92	1	12.5100	7.7600	15.4100
05 Mar 92	2	12.5000	7.7500	15.4300
05 Mar 92	3	12.2700	7.7500	15.6300

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
05 Mar 92	4	12.1700	7.7300	15.7400
05 Mar 92	5	12.1200	7.7100	15.8200
05 Mar 92	6	12.1200	7.6900	15.8400
05 Mar 92	7	11.9900	7.6200	15.9400
05 Mar 92	8	11.9000	7.7000	15.4500
05 Mar 92	9	11.9500	7.7700	15.9100
05 Mar 92	10	12.2400	7.7200	15.9400
05 Mar 92	11	12.8300	7.6400	15.7300
05 Mar 92	12	12.6500	7.6800	15.8700
05 Mar 92	13	13.0100	7.6500	15.0200
05 Mar 92	14	13.3600	7.6600	14.5600
05 Mar 92	15	13.5100	7.7000	14.5200
05 Mar 92	16	13.4200	7.8000	14.6000
05 Mar 92	17	13.0800	7.9200	14.8400
05 Mar 92	18	13.0200	7.9100	14.8800
05 Mar 92	19	13.3500	7.8400	14.9200
05 Mar 92	20	13.9300	7.7900	14.6900
05 Mar 92	21	13.6700	7.7700	14.8800
05 Mar 92	22	13.6900	7.8100	14.4200
05 Mar 92	23	14.3600	7.8300	13.6800
06 Mar 92	0	14.3800	7.8700	13.6600
06 Mar 92	1	12.9400	7.9700	14.7500
06 Mar 92	2	12.3100	8.0200	15.2400
06 Mar 92	3	12.8600	7.9700	14.8200
06 Mar 92	4	12.5500	8.1100	15.0300
06 Mar 92	5	12.1700	8.1400	15.4000
06 Mar 92	6	12.2100	8.1100	15.3700
06 Mar 92	7	12.2500	8.0800	15.3100
06 Mar 92	8	13.2100	7.9500	15.1200
06 Mar 92	9	13.3800	7.9400	15.0900
06 Mar 92	10	13.2000	7.9800	15.2000
06 Mar 92	11	13.1200	8.0300	14.9200

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
06 Mar 92	12	13.3800	7.9600	14.2900
06 Mar 92	13	13.8900	8.0000	13.9100
06 Mar 92	14	13.1500	8.0600	14.4800
06 Mar 92	15	12.3200	8.1500	15.1600
06 Mar 92	16	12.5900	8.0600	15.0000
12 Mar 92	0			
13 Mar 92	17	10.4700	8.0700	16.5500
13 Mar 92	18	10.7300	8.3300	17.7800
13 Mar 92	19	11.6500	8.2500	17.6400
13 Mar 92	20	10.9900	8.0900	17.4400
13 Mar 92	21	9.8300	7.9700	17.9700
13 Mar 92	22	9.3800	7.9300	18.4300
13 Mar 92	23	10.4400	8.0600	17.2400
14 Mar 92	0	10.6200	8.1000	16.8100
14 Mar 92	1	10.6600	8.1000	16.6600
14 Mar 92	2	10.5000	8.0800	16.9200
14 Mar 92	3	10.3100	8.0700	17.0500
14 Mar 92	4	10.2500	8.0800	17.0000
14 Mar 92	5	10.2600	8.0900	16.9600
14 Mar 92	6	9.9500	8.0700	17.1500
14 Mar 92	7	9.3200	8.0200	17.6500
14 Mar 92	8	9.2000	8.0200	17.6000
14 Mar 92	9	9.6400	8.0600	17.0100
14 Mar 92	10	10.4600	8.1300	16.9200
14 Mar 92	11	10.3700	8.1000	16.6800
14 Mar 92	12	9.7100	8.0700	16.9500
14 Mar 92	13	9.4300	8.0600	17.5300
14 Mar 92	14	10.8400	8.1300	16.5300
14 Mar 92	15	11.0000	8.3200	16.1100
14 Mar 92	16	11.2800	8.4700	15.7200
14 Mar 92	17	11.3700	8.4600	16.3400
14 Mar 92	18	10.8400	8.8400	16.7900

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
14 Mar 92	19	10.9400	8.5200	16.7600
14 Mar 92	20	10.5200	8.1800	16.8600
14 Mar 92	21	10.5100	8.1000	16.9100
14 Mar 92	22	10.6700	8.1100	16.7600
14 Mar 92	23	10.6600	8.1100	16.8300
15 Mar 92	0	10.6000	8.1000	17.0100
15 Mar 92	1	10.4400	8.0800	17.1300
15 Mar 92	2	10.3800	8.0700	17.2200
15 Mar 92	3	10.3300	8.0700	17.1500
15 Mar 92	4	10.3400	8.1000	16.9900
15 Mar 92	5	10.3000	8.0900	17.0100
15 Mar 92	6	10.2900	8.0900	16.9900
15 Mar 92	7	10.0400	8.0400	17.1000
15 Mar 92	8	9.6500	7.9700	17.2300
15 Mar 92	9	9.7500	8.0500	17.1000
15 Mar 92	10	10.2700	8.0800	16.7100
15 Mar 92	11	10.2300	8.0800	17.0600
15 Mar 92	12	10.2600	8.0400	17.2800
15 Mar 92	13	10.4300	8.0600	17.1000
15 Mar 92	14	10.6500	8.3600	17.2500
15 Mar 92	15	10.4600	8.8000	17.4400
15 Mar 92	16	10.7100	8.4300	17.5100
20 Mar 92	0			
21 Mar 92	12	11.4500	8.1800	16.0300
21 Mar 92	13	11.2500	7.7300	15.2200
21 Mar 92	14	12.0300	7.9100	15.0800
21 Mar 92	15	12.7000	8.6600	15.0000
21 Mar 92	16	13.1400	8.6000	14.7200
21 Mar 92	17	13.3400	8.8400	14.6500
21 Mar 92	18	13.4900	8.7000	14.4400
21 Mar 92	19	13.6600	8.1800	14.3500
21 Mar 92	20	13.5300	8.3500	14.9700

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
21 Mar 92	21	13.3800	8.3700	15.3400
21 Mar 92	22	13.3800	8.3000	15.1100
21 Mar 92	23	13.2200	8.3800	15.5300
22 Mar 92	0	13.0700	8.3500	15.5100
22 Mar 92	1	12.9500	8.2500	15.2600
22 Mar 92	2	12.8700	8.0500	14.5200
22 Mar 92	3	12.6200	8.0100	14.4800
22 Mar 92	4	12.3700	8.0100	14.5500
22 Mar 92	5	12.0300	7.9900	14.7500
22 Mar 92	6	11.7300	8.0000	14.8700
22 Mar 92	7	11.5600	8.0400	14.9900
22 Mar 92	8	11.3600	8.0200	15.0900
22 Mar 92	9	11.6600	8.2000	15.5300
22 Mar 92	10	12.0200	8.3100	15.7800
22 Mar 92	11	11.2400	8.1900	15.0800
22 Mar 92	12	11.0500	8.3200	14.9500
22 Mar 92	13	11.1000	7.9900	15.0100
22 Mar 92	14	11.1400	8.4300	15.0000
22 Mar 92	15	11.3100	8.7800	15.1200
22 Mar 92	16	11.3000	8.5200	15.1000
22 Mar 92	17	11.3900	8.4000	15.1800
22 Mar 92	18	11.3200	8.0900	15.1700
26 Mar 92	0			
27 Mar 92	15	11.9400	8.0200	10.9200
27 Mar 92	16	12.3100	7.8600	14.3000
27 Mar 92	17	12.6300	7.8700	14.2500
27 Mar 92	18	12.7600	8.0600	15.0800
27 Mar 92	19	12.8700	8.0800	15.2900
27 Mar 92	20	12.8300	8.1200	15.5300
27 Mar 92	21	12.8200	8.1300	15.6700
27 Mar 92	22	12.7500	8.1300	15.5900
27 Mar 92	23	12.5800	8.1400	15.7800

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
28 Mar 92	0	12.5500	8.1200	15.6100
28 Mar 92	1	12.7000	8.0700	15.4100
28 Mar 92	2	12.3700	8.1000	15.9300
28 Mar 92	3	12.4000	8.0200	15.4100
28 Mar 92	4	12.3000	8.0600	15.1500
28 Mar 92	5	12.1100	7.9900	14.5200
28 Mar 92	6	11.8700	7.9100	14.4900
28 Mar 92	7	11.6700	7.8900	14.5800
28 Mar 92	8	11.5200	7.9000	14.5500
28 Mar 92	9	11.4500	7.9200	14.6900
28 Mar 92	10	11.5100	7.8300	14.8800
28 Mar 92	11	11.3700	7.9200	14.7100
28 Mar 92	12	11.4000	7.6800	14.6400
28 Mar 92	13	11.6900	7.7200	14.6900
28 Mar 92	14	12.1400	7.7500	14.5800
28 Mar 92	15	12.8100	7.8700	14.3500
28 Mar 92	16	13.4200	8.0500	14.2300
28 Mar 92	17	13.5500	8.1100	14.6800
28 Mar 92	18	13.2700	8.0600	15.1700
28 Mar 92	19	13.4400	8.0000	14.8600
28 Mar 92	20	13.1500	8.0500	15.3300
28 Mar 92	21	13.2600	8.0800	15.3400
28 Mar 92	22	13.3400	8.0300	15.2400
28 Mar 92	23	13.2800	8.0700	15.3500
29 Mar 92	0	13.2600	8.1000	15.1900
29 Mar 92	1	13.2800	8.1400	14.7500
29 Mar 92	2	13.0600	8.1000	15.0400
29 Mar 92	3	12.8800	8.0600	15.5800
29 Mar 92	4	12.8200	8.1100	15.2100
29 Mar 92	5	12.7700	8.0600	14.5900
29 Mar 92	6	12.5600	7.8400	14.2800
29 Mar 92	7	12.3200	7.8000	14.2400

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
29 Mar 92	8	12.1200	7.8800	14.3300
29 Mar 92	9	12.0800	7.9500	15.2900
29 Mar 92	10	11.9100	7.8100	14.6300
29 Mar 92	11	11.8000	7.8300	14.3100
29 Mar 92	12	11.7900	7.7100	14.3200
29 Mar 92	13	11.8200	7.7500	14.5100
29 Mar 92	14	11.7800	7.7300	14.2500
29 Mar 92	15	11.8300	7.7600	14.3100
29 Mar 92	16	11.8900	7.7500	14.3800
29 Mar 92	17	12.0000	7.7700	14.4000
29 Mar 92	18	12.0900	7.7800	14.3100
29 Mar 92	19	12.1300	7.8000	14.3400
30 Mar 92	0			
31 Mar 92	14	12.5100	7.8500	17.4300
31 Mar 92	15	12.7000	7.8400	17.4800
31 Mar 92	16	13.3400	8.0200	16.6300
31 Mar 92	17	13.2600	8.0400	16.9600
31 Mar 92	18	13.4200	8.1200	17.1600
31 Mar 92	19	13.0100	8.1400	17.3500
31 Mar 92	20	12.5500	8.0000	17.9000
31 Mar 92	21	12.4400	8.0000	18.0700
31 Mar 92	22	12.3800	8.0500	18.2600
31 Mar 92	23	12.3300	8.1400	18.2900
01 Apr 92	0	12.3000	8.1000	18.1600
01 Apr 92	1	12.2300	8.1200	18.1300
01 Apr 92	2	12.1800	8.1500	18.0900
01 Apr 92	3	12.1500	8.1700	18.0800
01 Apr 92	4	12.1100	8.1900	18.0000
01 Apr 92	5	12.0700	8.2100	17.8700
01 Apr 92	6	12.0100	8.2500	17.9300
01 Apr 92	7	11.9400	8.2500	18.0900
01 Apr 92	8	11.9000	8.2000	17.7400

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
01 Apr 92	9	11.9900	8.2000	17.5000
01 Apr 92	10	11.8200	8.0800	16.5300
01 Apr 92	11	11.3000	7.8300	15.3300
01 Apr 92	12	11.2700	7.8400	15.7000
01 Apr 92	13	11.2700	8.0300	16.1600
01 Apr 92	14	11.4500	8.0100	15.8700
01 Apr 92	15	11.7600	8.0600	16.5200
01 Apr 92	16	11.7800	8.0300	16.5100
01 Apr 92	17	11.7500	7.9600	16.2900
01 Apr 92	18	11.7100	7.9400	16.1800
01 Apr 92	19	11.6500	7.9300	16.1700
01 Apr 92	20	11.6100	7.8900	16.0800
01 Apr 92	21	11.5700	7.9000	16.1100
01 Apr 92	22	11.5200	7.9700	16.3200
01 Apr 92	23	11.3700	7.9300	16.3600
02 Apr 92	0	11.2500	7.9400	16.3800
02 Apr 92	1	11.1000	7.9500	16.3700
02 Apr 92	2	10.9400	7.9400	16.3600
02 Apr 92	3	10.7900	7.9300	16.3600
02 Apr 92	4	10.6200	7.9100	16.3700
02 Apr 92	5	10.4900	7.9100	16.3800
02 Apr 92	6	10.4500	7.9300	16.4300
02 Apr 92	7	10.9000	8.0800	16.6800
02 Apr 92	8	11.0600	8.1700	17.3000
02 Apr 92	9	11.1800	8.2000	17.3200
02 Apr 92	10	11.2900	8.2400	17.3800
02 Apr 92	11	10.9800	8.2100	17.4200
02 Apr 92	12	11.3900	8.2800	17.8300
02 Apr 92	13	11.6400	8.3500	17.9600
02 Apr 92	14	11.9100	8.4200	18.1400
02 Apr 92	15	11.9600	8.4400	18.0600
02 Apr 92	16	11.9400	8.4600	18.3100

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
02 Apr 92	17	11.9700	8.4800	18.3800
02 Apr 92	18	11.9200	8.4900	18.4400
02 Apr 92	19	11.7600	8.4700	18.3900
02 Apr 92	20	11.6900	8.4300	18.3100
02 Apr 92	21	11.4700	8.3500	17.8000
02 Apr 92	22	10.9000	8.2300	17.3100
02 Apr 92	23	10.1600	8.0000	17.0100
03 Apr 92	0	10.0500	7.9400	16.9800
03 Apr 92	1	9.9800	7.9200	16.7800
03 Apr 92	2	9.9100	7.9100	16.8600
03 Apr 92	3	9.9600	7.9800	17.1600
03 Apr 92	4	10.0500	8.0600	17.3600
03 Apr 92	5	10.2900	8.1900	17.8500
03 Apr 92	6	10.8300	8.2800	17.8200
03 Apr 92	7	10.8700	8.2800	17.9300
03 Apr 92	8	10.5300	8.2300	17.7200
03 Apr 92	9	10.4300	8.2300	17.5500
03 Apr 92	10	10.5200	8.2400	17.6400
03 Apr 92	11	10.2800	8.2100	17.8200
03 Apr 92	12	10.2200	8.1500	17.5400
03 Apr 92	13	9.6500	8.0600	17.7600
03 Apr 92	14	9.9500	8.0600	17.4600
03 Apr 92	15	11.2400	8.2500	17.6600
03 Apr 92	16	11.4200	8.2600	17.2900
03 Apr 92	17	11.4600	8.2600	17.3500
03 Apr 92	18	11.3600	8.2100	17.2600
04 Apr 92	12	11.1800	8.1100	17.5600
04 Apr 92	13	10.9900	8.0900	17.1500
04 Apr 92	14	11.3000	8.1300	16.9800
04 Apr 92	15	11.5300	8.1600	16.7100
04 Apr 92	16	11.7200	8.2200	16.8300
04 Apr 92	17	11.7500	8.1700	16.5300

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
04 Apr 92	18	11.8400	8.1300	16.2900
04 Apr 92	19	12.0100	8.1200	16.1300
04 Apr 92	20	12.2000	8.1300	16.0600
04 Apr 92	21	12.3000	8.1400	15.9900
04 Apr 92	22	12.3100	8.1600	16.0000
04 Apr 92	23	12.2600	8.2200	16.1000
05 Apr 92	0	12.1600	8.2600	16.3100
05 Apr 92	1	12.0600	8.2500	16.1800
05 Apr 92	2	11.9800	8.2600	16.2200
05 Apr 92	3	11.8900	8.3500	16.6900
05 Apr 92	4	11.8400	8.3700	16.7200
05 Apr 92	5	11.7600	8.3800	16.7500
05 Apr 92	6	11.6800	8.3900	16.7100
05 Apr 92	7	11.6300	8.3900	16.9400
05 Apr 92	8	11.5900	8.3900	17.3000
05 Apr 92	9	11.6400	8.3700	17.4700
05 Apr 92	10	11.6900	8.4200	17.4700
05 Apr 92	11	11.8400	8.7400	17.2600
05 Apr 92	12	12.1500	8.9600	16.9900
05 Apr 92	13	12.3200	8.6900	17.3600
05 Apr 92	14	12.5100	8.6200	17.3900
05 Apr 92	15	12.6700	8.6100	17.5900
05 Apr 92	16	12.8600	8.5700	17.5400
05 Apr 92	17	13.0500	8.6500	17.4500
05 Apr 92	18	13.2500	8.6100	17.2000
05 Apr 92	19	13.3500	8.5400	16.7500
06 Apr 92	9	12.2000	8.4500	10.3900
06 Apr 92	10	12.2600	8.5400	10.4000
06 Apr 92	11	12.3200	8.4900	10.2500
06 Apr 92	12	12.3900	8.5200	11.4100
06 Apr 92	13	12.4200	8.5700	16.9300
06 Apr 92	14	12.5500	8.5400	18.0300

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
06 Apr 92	15	12.5800	8.5500	17.7500
06 Apr 92	16	12.5800	8.5700	18.0000
06 Apr 92	17	12.6400	8.4800	17.2600
06 Apr 92	18	12.1000	8.0600	15.0800
06 Apr 92	19	12.4100	8.1300	15.3000
06 Apr 92	20	12.6900	8.2900	15.8200
06 Apr 92	21	12.8700	8.3600	16.1100
06 Apr 92	22	13.0700	8.3600	16.1100
06 Apr 92	23	13.1300	8.2900	15.7700
07 Apr 92	0	13.1000	8.2300	15.4200
07 Apr 92	1	13.0400	8.1800	15.1700
07 Apr 92	2	13.0000	8.1600	15.0300
07 Apr 92	3	12.9600	8.1400	14.9100
07 Apr 92	4	12.9000	8.1500	15.1000
07 Apr 92	5	12.8000	8.1800	15.3200
07 Apr 92	6	12.7500	8.1500	14.9900
07 Apr 92	7	12.8800	8.1200	14.6600
07 Apr 92	8	12.8700	8.1000	13.6400
07 Apr 92	9	12.8700	8.0900	14.5400
07 Apr 92	10	12.7800	8.1100	14.5700
07 Apr 92	11	12.8500	8.1200	14.4700
07 Apr 92	12	12.8500	8.3300	14.5300
07 Apr 92	13	12.8400	8.2000	14.4900
07 Apr 92	14	12.8500	8.1300	14.3900
07 Apr 92	15	12.9100	8.1300	14.4300
07 Apr 92	16	12.9600	8.1300	14.4700
07 Apr 92	17	12.7800	8.3600	15.8600
07 Apr 92	18	12.6400	8.3600	16.5400
07 Apr 92	19	12.6300	8.3500	16.4000
07 Apr 92	20	12.5400	8.4300	16.7600
07 Apr 92	21	12.9400	8.4800	15.6800
07 Apr 92	22	13.1100	8.2200	15.0200

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
07 Apr 92	23	13.1800	8.1900	14.8400
08 Apr 92	0	13.1700	8.1700	14.8700
08 Apr 92	1	13.0900	8.1900	15.0400
08 Apr 92	2	12.9400	8.2500	15.3300
08 Apr 92	3	12.8600	8.2600	15.4800
08 Apr 92	4	12.8400	8.2300	15.3200
08 Apr 92	5	12.8000	8.2300	15.4200
08 Apr 92	6	12.5300	8.3000	16.0500
08 Apr 92	7	12.7800	8.3000	15.5100
08 Apr 92	8	12.2900	8.3600	16.2800
08 Apr 92	9	12.2600	8.3800	16.5700
08 Apr 92	10	12.5800	8.3100	15.5000
08 Apr 92	11	12.9400	8.0700	14.2300
08 Apr 92	12	13.0600	8.0500	14.1400
08 Apr 92	13	13.3000	8.0400	12.3000
08 Apr 92	14	13.5200	8.0900	13.6900
08 Apr 92	15	13.8100	8.1100	14.0500
08 Apr 92	16	14.1100	8.2000	13.9800
08 Apr 92	17	14.1400	8.1900	14.1800
08 Apr 92	18	13.6400	8.4500	16.0800
08 Apr 92	19	13.3300	8.5500	17.2900
08 Apr 92	20	13.2800	8.5700	17.7900
08 Apr 92	21	13.0000	8.5000	17.0800
08 Apr 92	22	12.6200	8.5200	17.0900
08 Apr 92	23	12.5700	8.5300	16.9900
09 Apr 92	0	12.5400	8.5300	16.9600
09 Apr 92	1	12.4600	8.5300	17.0300
09 Apr 92	2	12.4500	8.5200	17.0200
09 Apr 92	3	12.5000	8.5000	16.8100
09 Apr 92	4	12.4900	8.5100	16.6800
09 Apr 92	5	12.4500	8.5000	16.7000
09 Apr 92	6	12.3100	8.4900	17.1300

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
09 Apr 92	7	12.1900	8.4700	17.1900
09 Apr 92	8	12.2800	8.5100	17.2900
09 Apr 92	9	12.4100	8.5400	17.4300
09 Apr 92	10	12.6800	8.5700	16.9200
09 Apr 92	11	12.8700	8.5900	17.2200
09 Apr 92	12	13.9400	8.5800	16.6200
09 Apr 92	13	14.9200	8.7500	14.3700
09 Apr 92	14	15.0800	8.4500	13.2900
09 Apr 92	15	15.0700	8.3700	13.6200
09 Apr 92	16	15.8300	8.6100	14.5600
09 Apr 92	17	16.0400	8.7000	14.8000
09 Apr 92	18	15.4700	8.3400	14.0800
09 Apr 92	19	15.5500	8.3700	14.2200
09 Apr 92	20	15.5500	8.4500	15.5300
09 Apr 92	21	16.1500	8.4200	14.4100
09 Apr 92	22	16.8200	8.4400	13.9000
09 Apr 92	23	16.3300	8.4600	14.4600
10 Apr 92	0	16.2100	8.4200	14.2300
10 Apr 92	1	16.0400	8.3900	14.0900
10 Apr 92	2	15.8100	8.3500	14.1400
10 Apr 92	3	15.6200	8.3300	14.0600
10 Apr 92	4	15.3400	8.3200	14.0600
10 Apr 92	5	15.2100	8.3100	14.1200
10 Apr 92	6	15.2400	8.2600	13.8500
10 Apr 92	7	15.3000	8.3500	13.5500
10 Apr 92	8	15.3000	8.4900	13.6800
10 Apr 92	9	15.3400	8.3700	13.6400
10 Apr 92	10	15.3500	8.6400	13.5300
10 Apr 92	11	15.7500	8.4000	13.1500
10 Apr 92	12	15.6200	8.3700	13.5900
10 Apr 92	13	16.0400	8.4500	13.9600
10 Apr 92	14	15.3100	8.4500	15.1100

Table C.1 (continued)

Date	Hour	Temperature (°C)	pH	Dissolved oxygen (mg/L)
10 Apr 92	15	14.6500	8.4700	15.4000
10 Apr 92	16	14.7700	8.4900	15.6600
10 Apr 92	17	14.8700	8.5200	15.8200
10 Apr 92	18	15.3900	8.5300	15.3500
10 Apr 92	19	13.9200	8.5800	15.9400

Appendix D

WATER GRAB SAMPLE ANALYTICAL RESULTS FOR MONITORING OF SPECIFIC CONSTRUCTION ACTIVITIES

Table D.1. Water grab sample analytical results for monitoring of specific construction activities

Date	¹³⁷ Cs result	Rad. error	Units	TSP (mg/L)	Construction activity	¹³⁷ Cs result	Rad. error	Units
20 Aug 91	0.03	0.57	Bq/L		Sheet Pile	0.8	15.4	pCi/L
20 Aug 91	-0.05	0.49	Bq/L		Sheet pile	-1.4	13.2	pCi/L
21 Aug 91	0.21	0.47	Bq/L		Sheet pile	5.7	12.7	pCi/L
21 Aug 91	0.29	0.67	Bq/L		Sheet pile	7.8	18.1	pCi/L
11 Feb 92	12.90	1.50	pCi/L	10.0	Jet grout	1290.0	150.0	pCi/g
11 Feb 92	8.20	1.30	pCi/L	7.0	Jet grout	1171.4	185.7	pCi/g
13 Feb 92	6.60	1.00	pCi/L	8.4	Jet grout	785.7	119.0	pCi/g
13 Feb 92	9.10	1.00	pCi/L	8.5	Jet grout	1070.6	117.6	pCi/g
13 Feb 92	18.70	1.40	pCi/L	22.6	Jet grout	827.4	61.9	pCi/g
13 Feb 92	12.8	1.3	pCi/L	18.9	Jet grout	677.2	68.8	pCi/g
14 Feb 92	4.10	1.10	pCi/L	7.0	Jet grout	585.7	157.1	pCi/g
14 Feb 92	7.60	1.90	pCi/L	6.7	Jet grout	1134.3	283.6	pCi/g
14 Feb 92	37.60	2.60	pCi/L	11.8	Jet grout	3186.4	220.3	pCi/g
14 Feb 92	34.50	2.30	pCi/L	11.0	Jet grout	3136.4	209.1	pCi/g
14 Feb 92	45.40	3.60	pCi/L	20.2	Jet grout	2247.5	178.2	pCi/g
14 Feb 92	44.30	3.40	pCi/L	19.7	Jet grout	2248.7	172.6	pCi/g
14 Feb 92	41.40	2.90	pCi/L	16.4	Jet grout	2524.4	176.8	pCi/g
24 Feb 92	53.60	3.10	pCi/L	17.4	Jet grout	3080.5	178.2	pCi/g
24 Feb 92	39.60	2.60	pCi/L	14.8	Jet grout	2675.7	175.7	pCi/g
24 Feb 92	33.20	2.50	pCi/L	19.2	Jet grout	1729.2	130.2	pCi/g
24 Feb 92	38.8	3	pCi/L	16.4	Jet grout	2365.9	182.9	pCi/g
02 Mar 92	9.50	1.10	pCi/L	6.2	Jet grout	1532.3	177.4	pCi/g
02 Mar 92	60.40	3.20	pCi/L	20.0	Jet grout	3020.0	160.0	pCi/g
02 Mar 92	41.1	3.2	pCi/L	19.6	Jet grout	2096.9	163.3	pCi/g
07 Mar 92	1.40	1.10	Bq/L		Jet grout	37.8	29.7	pCi/L
07 Mar 92	1.40	1.10	Bq/L		Jet grout	37.8	29.7	pCi/L
07 Mar 92	6.10	1.80	Bq/L		Jet grout	164.9	48.7	pCi/L
07 Mar 92	6.10	1.80	Bq/L		Jet grout	164.9	48.7	pCi/L
07 Mar 92	4.30	2.00	Bq/L		Jet grout	116.2	54.1	pCi/L
07 Mar 92	4.30	2.00	Bq/L		Jet grout	116.2	54.1	pCi/L
07 Mar 92	6.30	1.60	Bq/L		Jet grout	170.3	43.2	pCi/L
07 Mar 92	6.30	1.60	Bq/L		Jet grout	170.3	43.2	pCi/L
08 Mar 92	3.70	1.50	Bq/L		Jet grout	100.0	40.5	pCi/L

D-4

Table D.1 (continued)

Date	¹³⁷ Cs result	Rad. error	Units	TSP (mg/L)	Construction activity	¹³⁷ Cs result	Rad. error	Units
08 Mar 92	3.70	1.50	Bq/L		Jet grout	100.0	40.5	pCi/L
08 Mar 92	-0.40	1.40	Bq/L		Jet grout	-10.8	37.8	pCi/L
08 Mar 92	-0.40	1.40	Bq/L		Jet grout	-10.8	37.8	pCi/L
08 Mar 92	1.70	1.30	Bq/L		Jet grout	46.0	35.1	pCi/L
08 Mar 92	1.70	1.30	Bq/L		Jet grout	46.0	35.1	pCi/L
08 Mar 92	1.20	0.80	Bq/L		Jet grout	32.4	21.6	pCi/L
08 Mar 92	1.20	0.80	Bq/L		Jet grout	32.4	21.6	pCi/L
08 Mar 92	0.30	1.90	Bq/L		Jet grout	-8.1	51.4	pCi/L
08 Mar 92	0.30	1.90	Bq/L		Jet grout	-8.1	51.4	pCi/L
09 Mar 92	0.30	1.80	Bq/L		Jet grout	8.1	48.7	pCi/L
09 Mar 92	0.30	1.80	Bq/L		Jet grout	8.1	48.7	pCi/L
09 Mar 92	1.40	1.50	Bq/L		Jet grout	37.8	40.5	pCi/L
09 Mar 92	1.40	1.50	Bq/L		Jet grout	37.8	40.5	pCi/L
09 Mar 92	-0.10	1.10	Bq/L		Jet grout	-2.7	29.7	pCi/L
09 Mar 92	4.80	1.40	Bq/L		Jet grout	129.7	37.8	pCi/L
09 Mar 92	4.80	1.40	Bq/L		Jet grout	129.7	37.8	pCi/L
10 Mar 92	7.50	1.60	Bq/L		Jet grout	202.7	43.2	pCi/L
10 Mar 92	7.50	1.60	Bq/L		Jet grout	202.7	43.2	pCi/L
10 Mar 92	9.80	1.80	Bq/L		Jet grout	264.9	48.7	pCi/L
10 Mar 92	9.80	1.80	Bq/L		Jet grout	264.9	48.7	pCi/L
10 Mar 92	11.00	2.00	Bq/L		Jet grout	297.3	54.1	pCi/L
10 Mar 92	11.00	2.00	Bq/L		Jet grout	297.3	54.1	pCi/L
11 Mar 92	11.00	2.00	Bq/L		Jet grout	297.3	54.1	pCi/L
11 Mar 92	11.00	2.00	Bq/L		Jet grout	297.3	54.1	pCi/L
11 Mar 92	12.00	2.00	Bq/L		Jet grout	324.4	54.	pCi/L
11 Mar 92	12.00	2.00	Bq/L		Jet grout	324.4	54.1	pCi/L
11 Mar 92	12.00	2.00	Bq/L		Jet grout	324.4	54.1	pCi/L
11 Mar 92	12.00	2.00	Bq/L		Jet grout	324.4	54.1	pCi/L
12 Mar 92	4.90	1.70	Bq/L		Jet grout	132.4	46.0	pCi/L
12 Mar 92	4.90	1.70	Bq/L		Jet grout	132.4	46.0	pCi/L
12 Mar 92	4.20	1.40	Bq/L		Jet grout	113.5	37.8	pCi/L
12 Mar 92	4.20	1.40	Bq/L		Jet grout	113.5	37.8	pCi/L
16 Mar 92	0.10	2.40	Bq/L		Jet grout	2.7	64.9	pCi/L

Table D.1 (continued)

Date	¹³⁷ Cs result	Rad. error	Units	TSP (mg/L)	Construction activity	¹³⁷ Cs result	Rad. error	Units
16 Mar 92	0.10	2.40	Bq/L		Jet grout	2.7	64.9	pCi/L
16 Mar 92	1.50	1.70	Bq/L		Jet grout	40.5	46.0	pCi/L
16 Mar 92	1.50	1.70	Bq/L		Jet grout	40.5	46.0	pCi/L
16 Mar 92	0.10	2.10	Bq/L		Jet grout	2.7	56.8	pCi/L
16 Mar 92	0.10	2.10	Bq/L		Jet grout	2.7	56.8	pCi/L
20 Mar 92	7.40	1.20	Bq/L		Jet grout	200.0	32.4	pCi/L
21 Mar 92	5.90	1.50	Bq/L		Jet grout	159.5	40.5	pCi/L
21 Mar 92	1.10	0.40	Bq/L		Jet grout	29.7	10.8	pCi/L
23 Mar 92	28.7	1.5	pCi/L	16.5	Jet grout	1739.4	90.9	pCi/g
23 Mar 92	29.1	1.6	pCi/L	16.5	Jet grout	1763.6	97.0	pCi/g
24 Mar 92	1.90	1.10	Bq/L		Jet grout	51.4	29.7	pCi/L
24 Mar 92	2.10	1.10	Bq/L		Jet grout	56.8	29.7	pCi/L
21 Mar 92	4.20	1.20	Bq/L		Jet grout	113.5	2.4	pCi/L
25 Mar 92	1.80	2.60	Bq/L		Jet grout	48.7	70.3	pCi/L
25 Mar 92	0.40	3.10	Bq/L		Jet grout	10.8	83.8	pCi/L
26 Mar 92	5.80	2.50	Bq/L		Dredging	156.8	67.6	pCi/L
26 Mar 92	158.3	5.1	pCi/L	47.0	Dredging	3368.1	108.5	pCi/g
26 Mar 92	161	5.3	pCi/L	47.0	Dredging	3425.5	112.8	pCi/g
26 Mar 92	0.40	3.90	Bq/L		Dredging	10.8	105.4	pCi/L
26 Mar 92	217.	10.	Total pCi	22.0	Dredging	0.0	0.0	pCi/g
26 Mar 92	49.2	2.4	Total	22.0	Dredging	2236.4	109.1	pCi/g
26 Mar 92	12.00	3.00	Bq/L		Dredging	324.4	81.1	pCi/L
30 Mar 92	17.3	1.5	pCi/L	11.5		1504.3	130.4	pCi/g
30 Mar 92	18.3	1.4		11.5		1591.3	121.7	pCi/g
31 Mar 92	2.00	3.30	Bq/L		Capping	54.1	89.2	pCi/L
31 Mar 92	0.30	3.10	Bq/L		Capping	8.1	83.8	pCi/L
31 Mar 92	-0.10	3.50	Bq/L		Capping	-2.7	94.6	pCi/L
01 Apr 92	0.60	2.10	Bq/L		Dredging	16.2	56.8	pCi/L
01 Apr 92	0		pCi/L	3.4	Dredging	0.0	0.0	pCi/g
01 Apr 92	0.70	2.10	Bq/L		Dredging	18.9	56.8	pCi/L
01 Apr 92	3.1	1.3	pCi/L	3.9	Dredging	794.9	333.3	pCi/g
01 Apr 92	2.60	1.80	Bq/L		Dredging	70.3	48.7	pCi/L
01 Apr 92	22.7	2.2	pCi/L	18.5	Dredging	1227.0	118.9	pCi/g

D-6

Table D.1 (continued)

Date	¹³⁷ Cs result	Rad. error	Units	TSP (mg/L)	Construction activity	¹³⁷ Cs result	Rad. error	Units
01 Apr 92	3.00	1.60	Bq/L		Dredging	81.1	43.2	pCi/L
01 Apr 92	274.5	7.5	pCi/L	38.4	Dredging	7148.4	195.3	pCi/g
01 Apr 92	263.8	6.7		38.4	Dredging	6869.8	174.5	pCi/g
01 Apr 92	1.70	1.50	Bq/L		Dredging	46.0	40.5	pCi/L
01 Apr 92	64.6	3.1	pCi/L	23.7	Dredging	2725.7	130.8	pCi/g
01 Apr 92	76.7	3.4		23.7	Dredging	3236.3	143.5	pCi/g
04 Apr 92	2.00	1.90	Bq/L		Drilling	54.1	51.4	pCi/L
04 Apr 92	27	1.8	pCi/L	8.5	Drilling	3176.5	211.8	pCi/g
06 Apr 92	1.20	.80	Bq/L		Drilling	32.4	48.7	pCi/L
06 Apr 92	5.1	1.1	pCi/L	6.5	Drilling	784.6	169.2	pCi/g
06 Apr 92	-0.40	2.40	Bq/L		Drilling	-10.8	64.9	pCi/L
06 Apr 92	3.3	1.3	pCi/L	8.1	Drilling	407.4	160.5	pCi/g
06 Apr 92	312	10.9	pCi/L	51.0	Drilling	6117.6	213.7	pCi/g
06 Apr 92	16.9	2.2	pCi/L	5.7	Drilling	2964.9	386.0	pCi/g
06 Apr 92	14.7	1.6	pCi/L	5.7	Drilling	2578.9	280.7	pCi/g
06 Apr 92	18	1.7	pCi/L	6.0	Drilling	3000.0	283.3	pCi/g
06 Apr 92	41.2	2.8	pCi/L	21.6	Drilling	1907.4	129.6	pCi/g
08 Apr 92	1.30	1.30	Bq/L		Drilling	35.1	35.1	pCi/L
08 Apr 92	8.7	1.8	pCi/L	9.6	Drilling	906.3	87.5	pCi/g
08 Apr 92	50.00	2.00	Bq/L		Drilling	1351.5	54.1	pCi/L
08 Apr 92	320	6.6	pCi/L	100.4	Drilling	3187.3	65.7	pCi/g
08 Apr 92	5.50	1.30	Bq/L		Drilling	148.7	35.1	pCi/L
08 Apr 92	36.6	3.1	pCi/L		Drilling	0.0	0.0	pCi/g
08 Apr 92	-0.20	1.60	Bq/L		Drilling	-5.4	43.2	pCi/L
08 Apr 92	26.00	2.00	Bq/L		Drilling	702.8	54.1	pCi/L
08 Apr 92	211.8	5.4	pCi/L		Drilling	0.0	0.0	pCi/g
08 Apr 92	88.00	3.00	Bq/L		Drilling	2378.6	81.1	pCi/L
08 Apr 92	598.5	11.5	pCi/L		Drilling	0.0	0.0	pCi/g
08 Apr 92	47.00	2.00	Bq/L		Drilling	1270.4	54.	pCi/L
08 Apr 92	355	7.1	pCi/L		Drilling	0.0	0.0	pCi/g
09 Apr 92	10.7	1.8	pCi/L	8.1	Drilling	1321.0	222.2	pCi/g
09 Apr 92	432.4	10.3	pCi/L	64.2	Drilling	6735.2	160.4	pCi/g
09 Apr 92	162.4	5.4	pCi/L	51.3	Drilling	3165.7	105.3	pCi/g

D-7

Table D.1 (continued)

Date	¹³⁷ Cs result	Rad. error	Units	TSP (mg/L)	Construction activity	¹³⁷ Cs result	Rad. error	Units
10 Apr 92	626.4	10.5	pCi/L	102.7	Drilling	6099.3	102.2	pCi/g
10 Apr 92	626.4	10.6	pCi/L	102.7	Drilling	6099.3	103.2	pCi/g
10 Apr 92	38.8	2.8	pCi/L	39.9	Drilling	972.4	70.2	pCi/g
10 Apr 92	293.3	6.2	pCi/L	64.6	Drilling	4540.2	96.0	pCi/g
10 Apr 92	13	1.9	pCi/L	12.5	Drilling	1040.0	152.0	pCi/g

Appendix E

QUALITY ASSURANCE/QUALITY CONTROL DATA

Table E.1. Project quality assurance/quality control data for 24-h composite samples.
 Match these values with those for Appendix A.

Sample I.D.		Date	River mile	Analysis	Result	Error	Units	QC sample type	Construction phase
629	Z	18 Sep 91	20.8	Turbidity	1.50		NTU	Duplicate	Rock armor
631	Z	19 Sep 91	20.8	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor
631	Z	19 Sep 91	20.8	Turbidity	1.10		NTU	Duplicate	Rock armor
632	Z	19 Sep 91	14.5	Turbidity	1.50		NTU	Duplicate	Rock armor
632	Z	19 Sep 91	14.5	Tot. susp. solids	14.00		mg/L	Duplicate	Rock armor
633	Z	20 Sep 91	20.8	Turbidity	1.90		NTU	Duplicate	Rock armor
633	Z	20 Sep 91	20.8	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor
633	G	20 Sep 91	20.8	¹³⁷ Cs	0.04	0.84	Bq/L	Rinse water	Rock armor
634	Z	23 Sep 91	20.8	Turbidity	1.30		NTU	Duplicate	Rock armor
634	Z	23 Sep 91	20.8	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor
635	Z	24 Sep 91	20.8	Turbidity	1.70		NTU	Duplicate	Rock armor
635	Z	24 Sep 91	20.8	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor
636	Z	24 Sep 91	14.5	Turbidity	1.70		NTU	Duplicate	Rock armor
636	Z	24 Sep 91	14.5	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor
643	Z	25 Sep 91	20.8	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor
643	Z	25 Sep 91	20.8	Turbidity	2.00		NTU	Duplicate	Rock armor
644	Z	25 Sep 91	14.5	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor
644	Z	25 Sep 91	14.5	Turbidity	1.40		NTU	Duplicate	Rock armor
645	Z	26 Sep 91	20.8	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor
645	Z	26 Sep 91	20.8	Turbidity	2.20		NTU	Duplicate	Rock armor
646	Z	26 Sep 91	14.5	Turbidity	1.50		NTU	Duplicate	Rock armor
646	Z	26 Sep 91	14.5	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor
647	Z	27 Sep 91	20.8	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor
647	G	27 Sep 91	20.8	¹³⁷ Cs	0.10	1.20	Bq/L	Rinse water	Rock armor
647	Z	27 Sep 91	20.8	Turbidity	2.40		NTU	Duplicate	Rock armor
648	Z	27 Sep 91	14.5	Turbidity	2.00		NTU	Duplicate	Rock armor
648	G	27 Sep 91	14.5	¹³⁷ Cs	-0.11	0.75	Bq/L	Rinse water	Rock armor
648	Z	27 Sep 91	14.5	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor
649	Z	30 Sep 91	20.8	Turbidity	1.30		NTU	Duplicate	Rock armor
649	Z	30 Sep 91	20.8	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor
651	Z	30 Sep 91	14.5	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor
651	Z	30 Sep 91	14.5	Turbidity	1.10		NTU	Duplicate	Rock armor
652	Z	01 Oct 91	20.8	Turbidity	1.45		NTU	Duplicate	Rock armor
652	Z	01 Oct 91	20.8	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor

Table E.1 (continued)

Sample I.D.		Date	River mile	Analysis	Result	Error	Units	QC sample type	Construction phase
653	Z	01 Oct 91	14.5	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor
653	Z	01 Oct 91	14.5	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor
653	Z	01 Oct 91	14.5	Turbidity	1.50		NTU	Duplicate	Rock armor
677	Z	03 Oct 91	20.8	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor
677	Z	03 Oct 91	20.8	Turbidity	1.20		NTU	Duplicate	Rock armor
678	Z	03 Oct 91	14.5	Turbidity	1.00		NTU	Duplicate	Rock armor
678	Z	03 Oct 91	14.5	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor
678	Z	03 Oct 91	14.5	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor
679	G	04 Oct 91	20.8	¹³⁷ Cs	0.09	0.51	Bq/L	Rinse water	Rock armor
679	Z	04 Oct 91	20.8	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor
679	Z	04 Oct 91	20.8	Turbidity	1.50		NTU	Duplicate	Rock armor
681	Z	04 Oct 91	14.5	Turbidity	2.40		NTU	Duplicate	Rock armor
681	Z	04 Oct 91	14.5	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor
681	G	04 Oct 91	14.5	¹³⁷ Cs	-0.06	0.75	Bq/L	Rinse water	Rock armor
682	Z	07 Oct 91	20.8	Turbidity	1.00		NTU	Duplicate	Rock armor
682	Z	07 Oct 91	20.8	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor
683	Z	07 Oct 91	14.5	Turbidity	0.62		NTU	Duplicate	Rock armor
683	Z	07 Oct 91	14.5	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor
685	Z	08 Oct 91	14.5	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor
685	Z	08 Oct 91	14.5	Turbidity	1.50		NTU	Duplicate	Rock armor
744	Z	29 Oct 91	20.8	Turbidity	0.80		NTU	Duplicate	
744	Z	29 Oct 91	20.8	Tot. susp. solids	2.00		mg/L	Duplicate	
745	Z	29 Oct 91	14.5	Tot. susp. solids	5.00		mg/L	Duplicate	
745	Z	29 Oct 91	14.5	Turbidity	1.00		NTU	Duplicate	
746	Z	30 Oct 91	20.8	Turbidity	2.90		NTU	Duplicate	
746	Z	30 Oct 91	20.8	Tot. susp. solids	5.00		mg/L	Duplicate	
747	Z	31 Oct 91	20.8	Tot. susp. solids	5.00		mg/L	Duplicate	
747	Z	31 Oct 91	20.8	Turbidity	1.10		NTU	Duplicate	
748	Z	31 Oct 91	14.5	Turbidity	1.50		NTU	Duplicate	
748	Z	31 Oct 91	14.5	Tot. susp. solids	5.00		mg/L	Duplicate	
749	Z	01 Nov 91	20.8	Turbidity	1.30		NTU	Duplicate	
749	Z	01 Nov 91	20.8	Tot. susp. solids	5.00		mg/L	Duplicate	
749	G	01 Nov 91	20.8	¹³⁷ Cs	0.06	0.48	Bq/L	Rinse water	
751	Z	04 Nov 91	20.8	Turbidity	1.10		NTU	Duplicate	
751	Z	04 Nov 91	20.8	Tot. susp. solids	5.00		mg/L	Duplicate	

E-5

Table E.1 (continued)

Sample I.D.		Date	River mile	Analysis	Result	Error	Units	QC sample type	Construction phase
752	Z	05 Nov 91	20.8	Tot. susp. solids	10.00		mg/L	Duplicate	
752	Z	05 Nov 91	20.8	Turbidity	2.70		NTU	Duplicate	
753	Z	05 Nov 91	14.5	Turbidity	2.50		NTU	Duplicate	
753	Z	05 Nov 91	14.5	Tot. susp. solids	6.00		mg/L	Duplicate	
754	Z	06 Nov 91	20.8	Turbidity	3.30		NTU	Duplicate	
754	Z	06 Nov 91	20.8	Tot. susp. solids	27.00		mg/L	Duplicate	
755	Z	06 Nov 91	20.8	Turbidity	1.50		NTU	Duplicate	
755	Z	06 Nov 91	20.8	Tot. susp. solids	5.00		mg/L	Duplicate	
756	Z	06 Nov 91	14.5	Tot. susp. solids	5.00		mg/L	Duplicate	
756	Z	06 Nov 91	14.5	Turbidity	1.80		NTU	Duplicate	
757	G	07 Nov 91	20.8	¹³⁷ Cs	0.35	0.47	Bq/L	Duplicate	
758	Z	11 Nov 91	20.8	Tot. susp. solids	5.00		mg/L	Duplicate	
758	Z	11 Nov 91	20.8	Turbidity	1.20		NTU	Duplicate	
759	Z	12 Nov 91	20.8	Tot. susp. solids	5.00		mg/L	Duplicate	
759	Z	12 Nov 91	20.8	Turbidity	1.50		NTU	Duplicate	
761	Z	12 Nov 91	14.5	Tot. susp. solids	5.00		mg/L	Duplicate	
761	Z	12 Nov 91	14.5	Turbidity	1.50		NTU	Duplicate	
764	Z	14 Nov 91	20.8	Tot. susp. solids	5.00		mg/L	Duplicate	
764	Z	14 Nov 91	20.8	Turbidity	1.10		NTU	Duplicate	
765	Z	14 Nov 91	14.5	Turbidity	1.10		NTU	Duplicate	
765	Z	14 Nov 91	14.5	Tot. susp. solids	5.00		mg/L	Duplicate	
766	Z	15 Nov 91	20.8	Tot. susp. solids	7.00		mg/L	Duplicate	
766	G	15 Nov 91	20.8	¹³⁷ Cs	0.13	0.56	Bq/L	Rinse water	
766	Z	15 Nov 91	20.8	Turbidity	1.90		NTU	Duplicate	
767	Z	18 Nov 91	20.8	Tot. susp. solids	9.00		mg/L	Duplicate	
767	Z	18 Nov 91	20.8	Turbidity	1.40		NTU	Duplicate	
768	Z	19 Nov 91	20.8	Tot. susp. solids	5.00		mg/L	Duplicate	
768	Z	19 Nov 91	20.8	Turbidity	1.40		NTU	Duplicate	
769	Z	19 Nov 91	14.5	Turbidity	1.70		NTU	Duplicate	
769	Z	19 Nov 91	14.5	Tot. susp. solids	5.00		mg/L	Duplicate	
771	Z	20 Nov 91	20.8	Tot. susp. solids	5.00		mg/L	Duplicate	
771	Z	20 Nov 91	20.8	Turbidity	1.40		NTU	Duplicate	
773	Z	21 Nov 91	14.5	Tot. susp. solids	5.00		mg/L	Duplicate	
773	Z	21 Nov 91	14.5	Turbidity	1.50		NTU	Duplicate	
774	G	22 Nov 91	20.8	¹³⁷ Cs	1.10	0.60	Bq/L	Rinse water	

Table E.1 (continued)

Sample I.D.		Date	River mile	Analysis	Result	Error	Units	QC sample type	Construction phase
789	Z	06 Dec 91	20.8	Tot. susp. solids	30.00		mg/L	Duplicate	
789	Z	06 Dec 91	20.8	Turbidity	25.00		NTU	Duplicate	
791	Z	06 Dec 91	14.5	Tot. susp. solids	20.00		mg/L	Duplicate	
791	Z	06 Dec 91	14.5	Turbidity	21.00		NTU	Duplicate	
795	Z	10 Dec 91	14.5	Tot. susp. solids	7.00		mg/L	Duplicate	
795	Z	10 Dec 91	14.5	Turbidity	4.30		NTU	Duplicate	
799	Z	12 Dec 91	14.5	Turbidity	2.90		NTU	Duplicate	
799	Z	12 Dec 91	14.5	Tot. susp. solids	5.00		mg/L	Duplicate	
802	G	13 Dec 91	14.5	¹³⁷ Cs	0.10	1.10	Bq/L	Rinse water	
802	Z	13 Dec 91	14.5	Tot. susp. solids	5.00		mg/L	Duplicate	
802	Z	13 Dec 91	14.5	Turbidity	2.20		NTU	Duplicate	
804	Z	16 Dec 91	14.5	Tot. susp. solids	6.00		mg/L	Duplicate	
804	Z	16 Dec 91	14.5	Turbidity	4.50		NTU	Duplicate	
805	Z	17 Dec 91	20.8	Tot. susp. solids	9.00		mg/L	Duplicate	
805	Z	17 Dec 91	20.8	Turbidity	8.40		NTU	Duplicate	
806	Z	17 Dec 91	14.5	Turbidity	6.80		NTU	Duplicate	
806	Z	17 Dec 91	14.5	Tot. susp. solids	6.00		mg/L	Duplicate	
808	Z	18 Dec 91	14.5	Tot. susp. solids	65.00		mg/L	Duplicate	
808	Z	18 Dec 91	14.5	Turbidity	22.00		NTU	Duplicate	
811	Z	19 Dec 91	14.5	Turbidity	5.20		NTU	Duplicate	
811	Z	19 Dec 91	14.5	Tot. susp. solids	9.00		mg/L	Duplicate	
813	Z	20 Dec 91	14.5	Tot. susp. solids	26.00		mg/L	Duplicate	
813	G	20 Dec 91	14.5	¹³⁷ Cs	0.27	0.53	Bq/L	Rinse water	
813	Z	20 Dec 91	14.5	Turbidity	14.00		NTU	Duplicate	
814	Z	26 Dec 91	20.8	Turbidity	4.10		NTU	Duplicate	
814	Z	26 Dec 91	20.8	Tot. susp. solids	8.00		mg/L	Duplicate	
815	Z	26 Dec 91	14.5	Tot. susp. solids	7.00		mg/L	Duplicate	
815	Z	26 Dec 91	14.5	Turbidity	4.00		NTU	Duplicate	
818	Z	30 Dec 91	20.8	Tot. susp. solids	53.00		mg/L	Duplicate	
818	Z	30 Dec 91	20.8	Turbidity	3.00		NTU	Duplicate	
819	Z	30 Dec 91	14.5	Tot. susp. solids	57.00		mg/L	Duplicate	
819	Z	30 Dec 91	14.5	Turbidity	3.00		NTU	Duplicate	
822	Z	31 Dec 91	14.5	Turbidity	16.00		NTU	Duplicate	
822	Z	31 Dec 91	14.5	Tot. susp. solids	39.00		mg/L	Duplicate	
824	Z	02 Jan 92	14.5	Tot. susp. solids	27.00		mg/L	Duplicate	

Table E.1 (continued)

Sample I.D.		Date	River mile	Analysis	Result	Error	Units	QC sample type	Construction phase
824	Z	02 Jan 92	14.5	Turbidity	8.00		NTU	Duplicate	
826	Z	03 Jan 92	14.5	Turbidity	5.00		NTU	Duplicate	
826	G	03 Jan 92	14.5	¹³⁷ Cs	-0.40	1.10	Bq/L	Rinse water	
826	Z	03 Jan 92	14.5	Tot. susp. solids	13.00		mg/L	Duplicate	
827	Z	06 Jan 92	20.8	Tot. susp. solids	11.00		mg/L	Duplicate	
827	Z	06 Jan 92	20.8	Turbidity	5.30		NTU	Duplicate	
828	Z	06 Jan 92	14.5	Tot. susp. solids	32.00		mg/L	Duplicate	
828	Z	06 Jan 92	14.5	Turbidity	13.00		NTU	Duplicate	
831	Z	07 Jan 92	14.5	Tot. susp. solids	43.00		mg/L	Duplicate	
831	Z	07 Jan 92	14.5	Turbidity	18.00		NTU	Duplicate	
835	Z	09 Jan 92	14.5	Tot. susp. solids	26.00		mg/L	Duplicate	
835	Z	09 Jan 92	14.5	Turbidity	16.00		NTU	Duplicate	
839	Z	13 Jan 92	14.5	Turbidity	53.00		NTU	Duplicate	
839	Z	13 Jan 92	14.5	Tot. susp. solids	258.00		mg/L	Duplicate	
842	Z	14 Jan 92	14.5	Tot. susp. solids	122.00		mg/L	Duplicate	
842	Z	14 Jan 92	14.5	Turbidity	30.00		NTU	Duplicate	
844	Z	15 Jan 92	14.5	Tot. susp. solids	12.00		mg/L	Duplicate	
844	Z	15 Jan 92	14.5	Turbidity	6.00		NTU	Duplicate	
846	Z	16 Jan 92	14.5	Tot. susp. solids	88.00		mg/L	Duplicate	
846	Z	16 Jan 92	14.5	Turbidity	28.00		NTU	Duplicate	
848	Z	17 Jan 92	14.5	Tot. susp. solids	10.00		mg/L	Duplicate	
848	G	17 Jan 92	14.5	¹³⁷ Cs	0.09	0.55	Bq/L	Rinse water	
848	Z	17 Jan 92	14.5	Turbidity	4.60		NTU	Duplicate	
851	Z	20 Jan 92	14.5	Tot. susp. solids	85.00		mg/L	Duplicate	
851	Z	20 Jan 92	14.5	Turbidity	25.00		NTU	Duplicate	
855	Z	22 Jan 92	14.5	Turbidity	3.40		NTU	Duplicate	
855	Z	22 Jan 92	14.5	Tot. susp. solids	5.00		mg/L	Duplicate	
857	Z	23 Jan 92	14.5	Tot. susp. solids	20.00		mg/L	Duplicate	
857	Z	23 Jan 92	14.5	Turbidity	10.00		NTU	Duplicate	
859	Z	24 Jan 92	14.5	Tot. susp. solids	7.00		mg/L	Duplicate	
859	Z	24 Jan 92	14.5	Turbidity	5.00		NTU	Duplicate	
859	G	24 Jan 92	14.5	¹³⁷ Cs	0.20	0.85	Bq/L	Rinse water	
862	Z	27 Jan 92	14.5	Turbidity	12.00		NTU	Duplicate	
862	Z	27 Jan 92	14.5	Tot. susp. solids	28.00		mg/L	Duplicate	

Table E.1 (continued)

Sample I.D.		Date	River mile	Analysis	Result	Error	Units	QC sample type	Construction phase
864	Z	28 Jan 92	14.5	Tot. susp. solids	39.00		mg/L	Duplicate	
864	Z	28 Jan 92	14.5	Turbidity	13.00		NTU	Duplicate	
866	Z	29 Jan 92	14.5	Tot. susp. solids	5.00		mg/L	Duplicate	
866	Z	29 Jan 92	14.5	Turbidity	3.00		NTU	Duplicate	
868	G	30 Jan 92	14.5	¹³⁷ Cs	-0.11	0.65	Bq/L	Rinse water	
878	G	08 Feb 92	20.8	¹³⁷ Cs	0.13	0.44	Bq/L	Rinse water	
881	Z	11 Feb 92	20.8	Turbidity	10.00		NTU	Duplicate	Jet grout
881	Z	11 Feb 92	20.8	Tot. susp. solids	20.00		mg/L	Duplicate	Jet grout
881	Z	11 Feb 92	20.8	pH	8.97			Duplicate	Jet grout
915	Z	18 Feb 92	20.8	Tot. susp. solids	6.00		mg/L	Duplicate	Jet grout
915	Z	18 Feb 92	20.8	Turbidity	5.00		NTU	Duplicate	Jet grout
936	G	21 Feb 92	20.8	¹³⁷ Cs	4.70	0.70	Bq/L	Rinse water	Jet grout
947	Z	03 Mar 92	20.8	Turbidity	8.00		NTU	Duplicate	Jet grout
947	Z	03 Mar 92	20.8	Tot. susp. solids	10.00		mg/L	Duplicate	Jet grout
947	Z	03 Mar 92	20.8	pH	8.19			Duplicate	Jet grout
948	Z	03 Mar 92	14.5	Turbidity	7.00		NTU	Duplicate	Jet grout
948	Z	03 Mar 92	14.5	pH	8.26			Duplicate	Jet grout
948	Z	03 Mar 92	14.5	Tot. susp. solids	12.00		mg/L	Duplicate	Jet grout
959	G	06 Mar 92	20.8	¹³⁷ Cs	3.60	0.60	Bq/L	Rinse water	Jet grout
962	Z	10 Mar 92	20.8	pH	8.21			Duplicate	Jet grout
962	Z	10 Mar 92	20.8	Tot. susp. solids	14.00		mg/L	Duplicate	Jet grout
963	Z	10 Mar 92	14.5	Tot. susp. solids	12.00		mg/L	Duplicate	Jet grout
963	Z	10 Mar 92	14.5	Turbidity	5.50		NTU	Duplicate	Jet grout
963	Z	10 Mar 92	14.5	pH	8.34			Duplicate	Jet grout
989	Z	17 Mar 92	14.5	Turbidity	5.60		NTU	Duplicate	Jet grout
989	Z	17 Mar 92	14.5	Tot. susp. solids	11.00		mg/L	Duplicate	Jet grout
989	Z	17 Mar 92	14.5	pH	8.45			Duplicate	Jet grout
989	Z	17 Mar 92	14.5	Turbidity	5.60		NTU	Duplicate	Jet grout
995	G	20 Mar 92	20.8	¹³⁷ Cs	3.90	0.50	Bq/L	Rinse water	Jet grout
997	Z	24 Mar 92	20.8	pH	8.34			Duplicate	Jet grout
997	Z	24 Mar 92	20.8	Turbidity	9.70		NTU	Duplicate	Jet grout
997	Z	24 Mar 92	20.8	Tot. susp. solids	10.00		mg/L	Duplicate	Jet grout
998	Z	24 Mar 92	14.5	pH	8.35			Duplicate	Jet grout
998	Z	24 Mar 92	14.5	Turbidity	10.00		NTU	Duplicate	Jet grout
998	Z	24 Mar 92	14.5	Tot. susp. solids	20.00		mg/L	Duplicate	Jet grout

Table E.1 (continued)

Sample I.D.		Date	River mile	Analysis	Result	Error	Units	QC sample type	Construction phase
1015	Z	26 Mar 92	20.8	Tot. susp. solids	23.00		mg/L	Duplicate	Dredging
1015	Z	26 Mar 92	20.8	pH	7.75			Duplicate	Dredging
1015	Z	26 Mar 92	20.8	Turbidity	10.50		NTU	Duplicate	Dredging
1016	Z	26 Mar 92	14.5	Turbidity	12.50		NTU	Duplicate	Dredging
1016	Z	26 Mar 92	14.5	Tot. susp. solids	34.00		mg/L	Duplicate	Dredging
1016	Z	26 Mar 92	14.5	pH	8.27			Duplicate	Dredging
1017	Z	27 Mar 92	20.8	pH	8.29			Duplicate	Dredging
1017	Z	27 Mar 92	20.8	Tot. susp. solids	32.00		mg/L	Duplicate	Dredging
1017	Z	27 Mar 92	20.8	Turbidity	12.40		NTU	Duplicate	Dredging
1017	G	27 Mar 92	20.8	¹³⁷ Cs	13.00	1.00	Bq/L	Rinse water	Dredging
1017	Z	27 Mar 92	20.8	pH	8.23			Duplicate	Dredging
1017	Z	27 Mar 92	20.8	Turbidity	10.50		NTU	Duplicate	Dredging
1019	Z	31 Mar 92	20.8	Tot. susp. solids	11.00		mg/L	Duplicate	
1019	Z	31 Mar 92	20.8	Turbidity	7.90		NTU	Duplicate	
1019	Z	31 Mar 92	20.8	pH	8.14			Duplicate	
1021	Z	31 Mar 92	14.5	pH	8.30			Duplicate	
1021	Z	31 Mar 92	14.5	Turbidity	17.50		NTU	Duplicate	
1021	Z	31 Mar 92	14.5	Tot. susp. solids	59.00		mg/L	Duplicate	
1024	Z	02 Apr 92	20.8	Tot. susp. solids	13.00		mg/L	Duplicate	Dredging
1024	Z	02 Apr 92	20.8	pH	7.37			Duplicate	Dredging
1024	Z	02 Apr 92	20.8	Turbidity	10.00		NTU	Duplicate	Dredging
1025	Z	02 Apr 92	14.5	Turbidity	3.80		NTU	Duplicate	Dredging
1025	Z	02 Apr 92	14.5	Tot. susp. solids	5.00		mg/L	Duplicate	Dredging
1025	Z	02 Apr 92	14.5	pH	8.28			Duplicate	Dredging
1026	G	03 Apr 92	20.8	¹³⁷ Cs	1.40	0.50	Bq/L	Duplicate	Dredging
1027	G	03 Apr 92	14.5	¹³⁷ Cs	0.20	0.30	Bq/L	Duplicate	Dredging
1028	Z	07 Apr 92	20.8	Tot. susp. solids	10.00		mg/L	Duplicate	Rock anchor
1028	Z	07 Apr 92	20.8	pH	8.28			Duplicate	Rock anchor
1028	Z	07 Apr 92	20.8	Turbidity	9.20		NTU	Duplicate	Rock anchor
1029	Z	07 Apr 92	14.5	Tot. susp. solids	35.00		mg/L	Duplicate	Rock anchor
1029	Z	07 Apr 92	14.5	Turbidity	12.50		NTU	Duplicate	Rock anchor
1029	Z	07 Apr 92	14.5	pH	8.28			Duplicate	Rock anchor
1063	G	10 Apr 92	20.8	¹³⁷ Cs	12.00	1.00	Bq/L	Rinse blank	Rock anchor
1064	G	10 Apr 92	14.5	¹³⁷ Cs	0.83	0.45	Bq/L	Rinse blank	Rock anchor

Table E.2. Project quality assurance/quality control data for surface water grab samples.
 Compare these values with those for Appendix D.

Sample I.D.		Date	River mile	Analysis	Result	Error	Units	QC sample type	Construction phase
608	P	20 Aug 91	20.80	Tot. susp. solids	5.00		mg/L	Rinse blank	Sheet pile
608	Z	20 Aug 91	20.80	Turbidity	0.21		NTU	Rinse blank	Sheet pile
608	P	20 Aug 91	20.80	Tot. susp. solids	5.00		mg/L	Rinse blank	Sheet pile
608	B	20 Aug 91	20.80	¹³⁷ Cs	0.10	0.58	Bq/L	Duplicate	Sheet pile
608	Z	20 Aug 91	20.80	Turbidity	1.60		NTU	Duplicate	Sheet pile
609	B	20 Aug 91	20.80	¹³⁷ Cs	0.25	0.33	Bq/L	Duplicate	Sheet pile
609	P	20 Aug 91	20.80	Tot. susp. solids	5.00		mg/L	Rinse blank	Sheet pile
609	Z	20 Aug 91	20.80	Turbidity	1.80		NTU	Rinse blank	Sheet pile
609	P	20 Aug 91	20.80	Tot. susp. solids	5.00		mg/L	Rinse blank	Sheet pile
609	Z	20 Aug 91	20.80	Turbidity	0.27		NTU	Duplicate	Sheet pile
611	B	21 Aug 91	20.80	¹³⁷ Cs	0.05	0.43	Bq/L	Rinse blank	Sheet pile
612	B	21 Aug 91	20.80	¹³⁷ Cs	0.05	0.43	Bq/L	Rinse blank	Sheet pile
686	Z	30 Sep 91	20.80	Turbidity	1.70		NTU	Duplicate	Rock armor
686	Z	30 Sep 91	20.80	Tot. susp. solids	5.00		mg/L	Duplicate	Rock armor
953	Z	02 Mar 92	20.80	Turbidity	12.50		NTU	Duplicate	Jet grout
953	Z	02 Mar 92	20.80	Tot. susp. solids	27.00		mg/L	Duplicate	Jet grout
976	Z	09 Mar 92	20.80	pH	7.42			Rinse blank	Jet grout
976	Z	09 Mar 92	20.80	Turbidity	0.29		NTU	Rinse blank	Jet grout
977	Z	09 Mar 92	20.80	Turbidity	0.21		NTU	Rinse blank	Jet grout
977	B	09 Mar 92	20.80	¹³⁷ Cs	0.30	2.00	Bq/L	Rinse blank	Jet grout
977	Z	09 Mar 92	20.80	pH	7.33			Rinse blank	Jet grout
979	Z	10 Mar 92	20.80	pH	7.94			Duplicate	
979	B	10 Mar 92	20.80	¹³⁷ Cs	8.60	2.00	Bq/L	Duplicate	
979	Z	10 Mar 92	20.80	Turbidity	24.00		NTU	Duplicate	
981	Z	10 Mar 92	20.80	pH	6.88			Rinse blank	Jet grout
981	Z	10 Mar 92	20.80	Turbidity	0.47		NTU	Rinse blank	Jet grout
1002	Z	11 Mar 92	20.80	pH	7.47			Duplicate	Jet grout
1002	Z	11 Mar 92	20.80	Turbidity	27.00		NTU	Duplicate	Jet grout
1002	B	11 Mar 92	20.80	¹³⁷ Cs	11.00	2.00	Bq/L	Duplicate	Jet grout
1002	Z	11 Mar 92	20.80	pH	7.74			Duplicate	Jet grout
1002	Z	11 Mar 92	20.80	Turbidity	0.40		NTU	Duplicate	Jet grout
1002	B	11 Mar 92	20.80	¹³⁷ Cs	11.00	2.00	Bq/L	Duplicate	Jet grout
1004	Z	12 Mar 92	20.80	Turbidity	29.00		NTU	Rinse blank	Jet grout
1004	Z	12 Mar 92	20.80	Turbidity	0.22		NTU	Rinse blank	Jet grout
1004	Z	12 Mar 92	20.80	pH	7.24			Rinse blank	Jet grout

Table E.2 (continued)

Sample I.D.		Date	River mile	Analysis	Result	Error	Units	QC sample type	Construction phase
1006	Z	16 Mar 92	20.80	Turbidity	3.90		NTU	Duplicate	Jet grout
1006	B	16 Mar 92	20.80	¹³⁷ Cs	0.60	2.20	Bq/L	Duplicate	Jet grout
1006	Z	16 Mar 92	20.80	pH	8.81			Duplicate	Jet grout
1006	B	16 Mar 92	20.80	¹³⁷ Cs	-0.60	2.20	Bq/L	Duplicate	Jet grout
1007	Z	16 Mar 92	20.80	pH	7.81			Rinse blank	Jet grout
1007	Z	16 Mar 92	20.80	Turbidity	0.20		NTU	Rinse blank	Jet grout
1034	B	25 Mar 92	20.80	¹³⁷ Cs	1.50	2.90	Bq/L	Duplicate	Jet grout
1034	B	25 Mar 92	20.80	¹³⁷ Cs	1.50	2.90	Bq/L	Duplicate	Jet grout
1077	Z	08 Apr 92	20.79	Turbidity	2.30		NTU	Duplicate	Drilling
1077	Z	08 Apr 92	20.79	pH	8.58			Duplicate	Drilling
1081	Z	08 Apr 92	20.80	pH	7.78			Rinse blank	Drilling
1081	Z	08 Apr 92	20.80	Turbidity	0.26		NTU	Rinse blank	Drilling

DISTRIBUTION

- 1. F. D. Adams
- 2. L. D. Bates
- 3. D. T. Bell
- 4. B. G. Blaylock
- 5. H. L. Boston
- 6. G. F. Cada
- 7. J. B. Cannon
- 8. R. B. Cook
- 9. J. H. Cushman
- 10. M. F. P. DeLozier
- 11. N. W. Durfee
- 12. J. T. Etheridge
- 13-17. C. J. Ford
- 18. D. E. Fowler
- 19. M. L. Frank
- 20. S. B. Garland
- 21. C. W. Gehrs
- 22. C. D. Goins
- 23. P. J. Halsey
- 24. S. G. Hildebrand
- 25. F. O. Hoffman
- 26. R. O. Hultgren
- 27. K. G. Kahl
- 28. P. Kanciruk
- 29. B. L. Kimmel
- 30. T. M. Koepp
- 31. F. C. Kornegay
- 32. E. H. Krieg
- 33. J. R. Lawson
- 34-36. D. M. Matteo
- 37. J. R. Merriman
- 38-39. P. T. Owen
- 40. F. S. Patton
- 41. D. E. Reichle
- 42. M. W. Rosenthal
- 43. T. H. Row
- 44. G. E. Rymer
- 45. F. E. Sharples
- 46. D. S. Shriner
- 47. S. H. Stow
- 48. R. R. Turner
- 49. S. D. Van Hoesen
- 50. R. I. Van Hook
- 51. D. Watkins
- 52-54. M. T. Wefer
- 55. R. K. White
- 56. R. Williams
- 57. P. S. Wood
- 58. Central Research Library
- 59-61. ESD Library
- 62. Clinch River Program DMC
- 63-67. ER Document Management Center
- 68. ORNL Laboratory Records
- 69. ORNL Patent Section

- 70. Office of Assistant Manager for Energy Research and Development, Department of Energy Oak Ridge Field Office, P.O. Box 2001, Oak Ridge, Tennessee 37831-8600
- 71-73. J. Bilyeu, Department of Energy, Office of Environmental Restoration, Eastern Area D&D Branch, EM-423 (GTN), Washington, DC 20545
- 74-78. M. Ferre, Department of Energy Oak Ridge Field Office, P. O. Box 2001, Oak Ridge, TN 37831-8541
- 79. J. F. Franklin, Bloedel Professor of Ecosystem Analysis, College of Forest Resources, University of Washington, Anderson Hall AR-10, Seattle, WA 98195
- 80. C. S. Gist, Department of Energy Oak Ridge Field Office, P.O. Box 2001, Oak Ridge, TN 37831-8541
- 81. R. C. Harriss, Institute for the Study of Earth, Oceans, and Space, Science and Engineering Research Building, University of New Hampshire, Durham, NH 03824
- 82. G. Y. Jordy, Director, Office of Program Analysis, Office of Energy Research, ER-30, G-226, U.S. Department of Energy, Washington, DC 20545
- 83. M. Leslie, CDM Federal Programs, 800 Oak Ridge Turnpike, Oak Ridge, TN 37830
- 84. R. L. Nace, Branch Chief, Nonenrichment Facilities, Oak Ridge Program Division, Office of Eastern Area Programs, Office of Environmental Restoration, EM-423, Trevion 2, U.S. Department of Energy, Washington, DC 20585
- 85. R. H. Olson, Professor, Microbiology and Immunology Department, University of Michigan, Medical Sciences II, #5605, 1301 East Catherine Street, Ann Arbor, MI 48109-0620

- 86-88. D. G. Page, Department of Energy Oak Ridge Field Office, P.O. Box 2001, Oak Ridge, TN 37831-8541
- 89. A. Patrinos, Director, Environmental Sciences Division, Office of Health and Environmental Research, Office of Energy Research, ER-74, U.S. Department of Energy, Washington, DC 20585
- 90-91. R. C. Sleeman, Department of Energy Oak Ridge Field Office, P.O. Box 2001, Oak Ridge, TN 37831-8541
- 92-93. J. T. Sweeney, Department of Energy Oak Ridge Field Office, P.O. Box 2001, Oak Ridge, TN 37831-8541
- 94. D. W. Swindle, Radian Corporation, 120 South Jefferson Circle, Oak Ridge, TN 37830
- 95. H. M. Thron, Chief, Enrichment Facilities, Oak Ridge Program Division, Office of Eastern Area Programs, Office of Environmental Restoration, EM-423, Trevion 2, U.S. Department of Energy, Washington, DC 20585
- 96. F. J. Wobber, Environmental Sciences Division, Office of Health and Environmental Research, Office of Energy Research, ER-74, U.S. Department of Energy, Washington, DC 20585
- 97-98. Office of Scientific and Technical Information, P.O. Box 62, Oak Ridge, TN 37831